

POLYGALACEAE

远志科 *yuan zhi ke*

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Perennial or annual herbs or shrubs or trees, rarely small herbs (the latter sometimes saprophytic). Leaves simple, alternate, opposite, or whorled, petiolate or sessile, papery or leathery, with pinnate veins, margin entire, leaves rarely reduced and scalelike; stipules absent, sometimes spiniform or scalelike appendages present. Flowers bisexual, zygomorphic, white, yellow, or purple-red, pedicellate or sessile, in axillary or terminal racemes, panicles, or spikes, with bracts and usually also with bracteoles. Calyx persistent or caducous; sepals 5, free or connate at base, outer 3 small, inner 2 (alae) large, petal-like, or all 5 nearly equal. Petals 3 or 5, basally often connate, lower (median) one (“keel”) usually inflexed, carinate, sometimes with fimbriate or lamellate or papilionaceous apical appendages. Stamens 8, 7, 5, or 4; filaments free, or variously united and forming a sheath open on upper side and troughlike; anthers basifixed, usually dehiscent by a single apical pore. Disk usually absent, if present annular or glandular. Ovary superior, 1- or 2-loculed; ovule 1 per locule, anatropous, pendulous, rarely ovules numerous and placentas parietal; style 1, erect or curved; stigmas 1 or 2, capitate. Fruit a 2-loculed capsule, dehiscent by valves, or a 1-loculed samara or a berrylike drupe, dehiscent or not. Seeds 2, or 1 with 1 sterile locule, yellow-brown, dark castaneous, or black, ovoid, globose, or ellipsoidal, glabrous or piliferous, strophiolate or not, with or without endosperm, sometimes with an appendage at end opposite to strophiole.

Thirteen to 17 genera and about 1000 species: widespread worldwide, especially in tropical and subtropical regions of both hemispheres; five genera and 53 species (24 endemic) in China.

Chinese genera of economic importance include *Polygala* (medicinal), *Salomonina* (medicinal), *Securidaca* (medicinal), and *Xanthophyllum* (fine wood).

Chen Shukun. 1997. Polygalaceae. In: Chen Shukun, ed., Fl. Reipubl. Popularis Sin. 43(3): 132–203.

- 1a. Trees or erect shrubs; petals 5; stamens 8, free, or 2–5 adnate at base of ovary or petals; fruit globose 1. *Xanthophyllum*
- 1b. Erect herbs, scandent shrubs, or trees; petals 3 (but often with 2 enlarged petal-like sepals); stamens 4–8, filaments connate; fruit flattened.
 - 2a. Stamens 4 or 5; fruit a capsule.
 - 3a. Saprophytes lacking chlorophyll; leaves yellow-brown, scalelike, shorter than 3 mm; capsule indehiscent, without a dentate margin 5. *Epirixanthes*
 - 3b. Plants autotrophic, green; leaves green, largest leaf at least 4 mm; capsule dehiscent, with a dentate margin 4. *Salomonina*
 - 2b. Stamens 8, rarely 6 or 7; fruit a samara or capsule without a dentate margin.
 - 4a. Scandent shrubs; fruit winged, 1-seeded 2. *Securidaca*
 - 4b. Erect shrubs, small trees, or herbs, rarely scandent shrubs (*Polygala tricholopha*); fruit not winged, 2-seeded 3. *Polygala*

1. XANTHOPHYLLUM Roxburgh, Pl. Coromandel 3: 81. 1820, nom. cons.

黄叶树属 *huang ye shu shu*

Trees or shrubs. Leaves simple, alternate, without stipules, petiolate; leaf blade usually yellow-green when dry, leathery, veinlets reticulate, margin entire. Flowers bisexual, zygomorphic, shortly pedicellate, in racemes or panicles, axillary or terminal; bracts and bracteoles present. Sepals 5, imbricate, inner 2 slightly larger. Petals 5, differing slightly in size, imbricate, sometimes unguiculate, free, keel without apical appendages. Stamens 8; filaments free or 2–4 adherent at base of ovary, other 4–6 adherent at base of petals, ± slightly inflated, pubescent; anthers introrse, usually piliferous at base. Disk annular, fleshy, shorter than ovary. Ovary superior; carpels 2, connate, stalked, 1-loculed, glabrous or piliferous, placentation parietal; ovules 2 to numerous, anatropous; style 1, hairy; stigma capitate, shallowly lobed. Fruit a drupe, globose, fibrous-fleshy when dry, 1-loculed. Seed usually 1; seed coat membranous; caruncle absent; endosperm absent.

About 93 species: mostly in Australia, India, Indonesia, and Malaysia; four species (two endemic) in China.

- 1a. Shrubs or small trees; leaf blade thickly papery, elliptic, apex caudate-acuminate, acumen to 3 cm 1. *X. oliganthum*
- 1b. Trees; leaf blade leathery, lanceolate or obovate-elliptic, apex not caudate-acuminate.
 - 2a. Axillary buds 2, overlapping; leaf blade linear-lanceolate; raceme axillary, shorter than 4 cm 2. *X. yunnanense*

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- 2b. Axillary bud 1; leaf blade ovate-elliptic to lanceolate, not linear-lanceolate; raceme or panicle terminal or axillary, longer than 4 cm.
- 3a. Inflorescences much branched, to 15 cm; flowers usually subopposite or pseudowhorled; leaf blade lanceolate to oblong-lanceolate, 10–24 × 2.5–6.5 cm 3. *X. flavescens*
- 3b. Inflorescences paniculate or racemose, 3–9 cm; flowers not subopposite or pseudowhorled; leaf blade ovate-elliptic to oblong-lanceolate, 4–12 × 1.5–5 cm 4. *X. hainanense*

1. *Xanthophyllum oliganthum* C. Y. Wu, Acta Bot. Yunnan. 2: 75. 1980.

少花黄叶树 shao hua huang ye shu

Shrubs to small trees, 2–4 m tall. Young branches slender, glabrous. Petiole yellow-brown, ca. 5 mm; leaf blade greenish, elliptic, 11–14 × 2.5–5 cm, thickly papery, both surfaces glabrous, midvein raised on both surfaces, lateral veins 6 or 7 pairs, raised abaxially, anastomosing near margin, tertiary veins parallel, veinlets reticulate, base cuneate, margin slightly undulate when dry, apex caudate-acuminate, acumen to 3 cm. Racemes or panicles terminal or axillary, ca. 4 cm, few flowered; pedicels 4–7 mm, slender, densely white pubescent. Sepals pubescent outside; outer 3 oblong, ca. 5 × 5 mm, ciliate; inner 2 suborbicular, ca. 5 mm wide. Petals yellow-white, nearly equal, 1–1.2 cm, keel white pubescent at base outside. Stamens 8, 5 adherent at base of petals, other 3 free; filaments inflated in lower part, pubescent; anthers ovoid-sagittate, ca. 1 mm, slightly furcate at base. Disk discoid. Ovary ovoid, with stalk, 1.5–2 mm in diam., glabrous; style ca. 9 mm, densely yellow-white pubescent; stigma slightly lobed. Drupe 2–3 cm in diam. Seed deep blue-green, compressed globose, ca. 1.6 cm in diam.; endosperm absent; cotyledon plump. Fl. and fr. Apr.

• Dense forests, mixed forests of bamboos and trees in valleys; 200–300 m. SE Yunnan.

2. *Xanthophyllum yunnanense* C. Y. Wu, Acta Bot. Yunnan. 2: 77. 1980.

云南黄叶树 yun nan huang ye shu

Trees 10–15 m tall; trunk to 15–35 cm d.b.h. Branchlets yellow or straw-colored, slender, scabrous, glabrous; axillary buds 2, overlapping. Petiole yellow-brown, 6–10 mm, adaxially sulcate; leaf blade linear-lanceolate, 8–15 × 1.8–3.5 cm, leathery, both surfaces glabrous, midvein yellow, raised on both surfaces, lateral veins 7 or 8 pairs, raised abaxially, curved, anastomosing near margin, tertiary veins not parallel, veinlets reticulate, base cuneate, margin slightly undulate when dry, apex acuminate. Racemes axillary, densely yellow pubescent. Flowers not seen. Infructescences 2.5–3.4 cm, densely yellow-brown tomentose; fruit stalk short, ca. 5 mm, stout, yellowish brown tomentose. Drupe green, ca. 2 cm in diam., glabrous. Seed black, rounded; cotyledon plump. Fl. unknown, fr. Jul–Sep.

• Mixed forests; 1800–2000 m. S Yunnan (Menghai).

3. *Xanthophyllum flavescens* Roxburgh, Pl. Coromandel 3: 82. 1820.

泰国黄叶树 tai guo huang ye shu

Xanthophyllum siamense Craib.

Trees 5–25(–32) m tall; trunk 15–35 cm d.b.h.; bark gray, cork thick. Branchlets slender, yellow tomentose, angular.

Petiole deep yellow-brown, ca. 1 cm, adaxially sulcate; leaf blade greenish, shiny, lanceolate or oblong-lanceolate, 10–24 × 2.5–6.5 cm, leathery, both surfaces glabrous, midvein raised abaxially, evident adaxially, lateral veins 6–8 pairs, raised abaxially, distinct adaxially, anastomosing near margin, veinlets reticulate, base cuneate, margin sometimes undulate, apex acuminate (tip to 1.5 cm). Racemes or panicles terminal or axillary, usually much branched, to 15 cm; terminal branchlets equaling lateral ones, densely yellow tomentose; peduncles usually compressed, ca. 9 mm; pedicels ca. 6 mm; bracteoles triangular-subulate, ca. 1 mm, densely yellow tomentose. Flowers usually subopposite and pseudowhorled. Sepals: outer 2 ovate or elliptic-ovate, ca. 2.5 × 1.8–2.3 mm, both surfaces tomentose, apex acuminate; inner 3 obovate-elliptic or elliptic, ca. 3.5 × 2.3 mm, both surfaces pubescent, ciliate. Petals white, 6–7 mm, keel abaxially pilose. Stamens 8, 5–7 mm; filaments shortly adherent at base of petals, inflated, villous; anthers sagittate-ovoid, ca. 0.8 mm, slightly furcate at base. Disk annular, 1.5–2 mm in diam. Ovary subglobose, ca. 1.5 mm in diam., with stalk ca. 1 mm, plump, smooth; style ca. 6 mm, villous; stigma slightly lobed. Drupe green when young, ca. 1.8 cm in diam., glabrous; fruit stalk 0.5–1 mm. Seed not seen. Fl. Mar–Apr, fr. May–Jul.

Damp dense forests; 500–2000 m. S Yunnan [Cambodia, Laos, Myanmar, Thailand].

4. *Xanthophyllum hainanense* Hu, J. Arnold Arbor. 6: 142. 1925.

黄叶树 huang ye shu

Trees 5–20 m tall; bark gray, longitudinally thinly fissured. Branchlets terete, slender, glabrous. Petiole 6–10 mm, transversely rugose, sulcate adaxially; leaf blade yellow-green when dry, ovate-elliptic to oblong-lanceolate, 4–12 × 1.5–5 cm, leathery, both surfaces glabrous, midvein and lateral veins raised on both surfaces, lateral veins 9–11 pairs, anastomosing near margin, veinlets reticulate, raised abaxially, distinct adaxially, base cuneate or obtuse, margin sometimes undulate, apex long acuminate. Racemes or small panicles axillary or terminal, 3–9 cm; peduncles and pedicels densely pubescent; bracteole 1, caducous, lanceolate. Flowers fragrant, small. Sepals with both surfaces pubescent, ciliate; outer 3 ovate, small, ca. 2 mm, apex acute; inner 2 elliptic to oblong, large, ca. 4 mm, apex rounded. Petals yellow-white, elliptic or oblong-lanceolate, ca. 7 mm, apex obtuse, thinly ciliate. Stamens 8, free, 4(–8) mm, lower parts villous; anthers basifixed, ellipsoidal, ca. 0.5 mm. Ovary pitcher-shaped, ca. 1 mm in diam., densely pubescent; ovules 4; style 3–6 mm, slightly pubescent at base; stigma capitate. Drupe yellowish, 1.5–2 cm in diam., pubescent or subglabrous; fruit stalk terete, ca. 5 mm, stout, pubescent. Seed yellowish, subglobose, ca. 8 mm in diam. Fl. Mar–May, fr. Apr–Jul.

Mountain forests; 100–600 m. Guangdong, Guangxi, Hainan [Vietnam].

2. SECURIDACA Linnaeus, Syst. Nat., ed. 10, 2: 1151, 1155. 1759, nom. cons., not Linnaeus (1753).

蝉翼藤属 chan yi teng shu

Shrubs scandent. Leaves simple, alternate; nodal glands present, veinlets reticulate. Inflorescences racemose or paniculate, terminal or axillary. Flowers zygomorphic, small, with bracts. Sepals 5, caducous, unequal; outer 3 small; inner 2 petaloid, large. Petals 3, lateral petals and keel connate or free, keel helmet-shaped, with apical appendage. Stamens 8; filaments united in lower part, forming trough-shaped sheath open on upper side and adnate to petals; anthers 2-celled, ovoid, dehiscent by oblique pores. Disk reniform. Ovary 1-loculed; ovule 1, anatropous, pendulous; style falcate, curved; stigma short, lobed or not. Fruit usually a samara, with 1 seed; wing oblong or rhombic-oblong, leathery, veins numerous. Seed subglobose, without endosperm, without strophiole; seed coat membranous.

About 80 species: primarily in tropical America, a small number of species distributed in tropical regions of Africa and Asia; two species (one endemic) in China.

- 1a. Inflorescences shorter than 12 cm, few flowered; fruiting body 12–16 mm in diam., winged and with winged appendage 1. *S. yaoshanensis*
 1b. Inflorescences longer than 12 cm, more densely flowered; fruiting body 7–15 mm in diam., winged but without winged appendage 2. *S. inappendiculata*

1. *Securidaca yaoshanensis* K. S. Hao, Repert. Spec. Nov. Regni Veg. 40: 213. 1936.

瑶山蝉翼藤 yao shan chan yi teng

Shrubs 2–3 m tall. Stem ± terete, slightly furrowed. Branchlets yellow-brown to deep castaneous, or yellowish, very shortly thinly strigose. Petiole 4–7 mm, slightly and thinly strigose, with 2 “mushroom-shaped” glands at base; leaf blade greenish, ovate-oblong, 5–10.5 × 3.5–4 cm, thickly papery or leathery, abaxially glabrous or very shortly and thinly strigose, adaxially glabrous, midvein raised abaxially, sunken adaxially, lateral veins 5–7 pairs, base rounded, margin entire, slightly recurved, apex acuminate. Panicles terminal or axillary, 5–11 cm, yellow strigose; pedicels 1–1.4 cm, glabrous; bracteoles 3, caducous, triangular-subulate, unequal, sparsely yellow strigose. Sepals 5, outer 3 ovate, subequal, small, ca. 3 × 2 mm, apex obtuse; inner 2 petaloid, suborbicular, large, ca. 5 mm in diam., base cuneate, apex retuse, ciliate. Petals 3, connate below middle, purplish red, ca. 6 mm, keel with small appendage; lateral petals shorter, ca. 4 mm. Ovary compressed, ovoid-oblong, ca. 1.5 mm, 1-loculed; ovule 1; style ca. 3.5 mm, smooth; stigma capitate, slightly lobed. Samara green-purple, with wing and wing-shaped appendage; wing oblong or subrhombic, 5–6 × 1.6–2 cm, leathery, with much-curved veins; body of fruit subglobose, 1.2–1.6 cm in diam., fruit coat thick, hard, indehiscent, with conspicuous reticulate veins. Seed 1, subglobose, 8–16 mm in diam. Fl. Jul, fr. Oct.

- Forests; 1000–1500 m. Guangdong, Guangxi, Yunnan.

2. *Securidaca inappendiculata* Hasskarl, Pl. Jav. Rar. 295. 1848.

蝉翼藤 chan yi teng

Securidaca bracteata A. W. Bennett; *S. scandens* Buchanan-Hamilton ex Bentham (1861), not Jacquin (1760), nor Lamarck ex Poiret (1806); *S. tavoyana* Wallich ex A. W. Bennett.

Shrubs ca. 6 m tall [large woody climbers to 20 m in Nepal]. Branchlets thin, densely sticky and shortly strigose. Leaves simple, alternate; petiole 5–8 mm, shortly strigose; leaf blade green, elliptic or obovate-oblong, 7–12 × 3–6 cm, papery or subleathery, densely sticky with short strigose hairs, sometimes adaxially glabrous, midvein raised abaxially, impressed adaxially, lateral veins 10–12 pairs, anastomosing near margin, veinlets reticulate, base obtuse to subrounded, margin entire, apex acute. Panicles terminal or axillary, 13–15 cm, shortly yellowish brown strigose; bracts caducous, minute. Sepals 5, unequal; outer 3 oblong-ovate, nearly equal, small, ca. 2 mm, apex obtuse, ciliate; inner 2 petaloid, large, ca. 7 × 5 mm, base clawed, apex obtuse, ciliate. Petals 3, basally connate, purplish red; lateral petals obtriangular, ca. 5 × 2.5 mm, apex truncate, keel weakly rounded, ca. 8 mm, apex with cucullate appendage. Ovary subglobose, ca. 1 mm in diam.; style curved, inclined to one side. Samara and fruit body globose, 7–15 mm in diam., fruit coat thick, hard, conspicuously veined, apex leathery winged; wing oblong, 6–8 × 1.5–2 cm, with strongly curved veins, base narrower, apex obtuse. Seed 1, brownish, ovoid, ca. 7 mm in diam. Fl. May–Aug, fr. Oct–Dec.

Dense forests in valleys; 500–1100 m. Guangdong, Guangxi, Hainan, Yunnan [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand, Vietnam].

3. POLYGALA Linnaeus, Sp. Pl. 2: 701. 1753.

远志属 yuan zhi shu

Annual or perennial herbs, or shrubs or small trees, rarely small, woody climbers. Leaves simple, alternate, rarely opposite or whorled, petiolete; leaf blade papery or subleathery, margin entire, glabrous or pilose. Racemes terminal, axillary, or extra-axillary. Flowers bisexual, zygomorphic; bracts 1–3, persistent or caducous; bracteoles present. Sepals 5, unequal, persistent or caducous, in 2 ranks; outer 3 small; inner 2 petaloid, large. Petals 3, connate in lower 1/2, white, yellow, or purple-red, keel boat-shaped, cucullate, or helmet-shaped enclosing stamens and style, apex with often highly divided appendage. Stamens 8; filaments united at least at base, forming trough-shaped sheath (“staminal sheath”), open on upper side, adnate with petals, variously united or free above; anthers

basifixed, with or without stalk, 1- or 2-celled, dehiscent from terminal pore or slit. Disk present or absent. Ovary 2-loculed, compressed; ovule 1 per locule, anatropous, pendulous; style 1, erect or curved; stigmas 1 or 2. Fruit capsular, compressed, often winged. Seeds 2, usually black, ovoid, rounded or shortly cuneate, pubescent or glabrous, strophiolate at hiliferous end, strophiole cap-shaped, cucullate, margin entire or variously lobed, other end sometimes with appendage.

About 500 species: widespread worldwide; 44 species (21 endemic) in China.

- 1a. Sepals persistent after flowering; keel with apical appendage highly filiform-fimbriate.
- 2a. Filaments united, forming an open staminal sheath split in upper 1/2–2/3, with 2 separate single filaments in middle, and on either side of these, a united group of 3 filaments each carrying 3 sessile anthers at tip.
- 3a. Annual herbs, usually shorter than 15 cm tall; racemes axillary or extra-axillary, shorter than leaves; flowers white, rarely purple-red, lateral petals deltoid-rhombic, margin sometimes undulate; capsule ca. 2 mm in diam., minutely winged 30. *P. polifolia*
- 3b. Perennial herbs, erect, more than 15 cm tall; racemes terminal or pseudoterminal, rarely axillary, longer than leaves; flowers purple-red, lateral petals oblong or elliptic, margin not undulate; capsule ca. 4 mm in diam., obviously winged.
- 4a. Petals 2; stamens 6–8; capsule margin ciliate; strophiole 3-lobed; leaf blade 3–4 mm wide 31. *P. monopetala*
- 4b. Petals 3; stamens 8; capsule margin not ciliate; strophiole 2-lobed; leaf blade 0.5–1(–3) mm wide 32. *P. tenuifolia*
- 2b. Filaments united throughout their length forming an open staminal sheath, or united in lower 1/3–2/3 forming an open staminal sheath with upper 1/3–2/3 free or grouped into 2 lobes.
- 5a. Filaments united for entire length, forming an open staminal sheath.
- 6a. Racemes terminal; lateral petals much longer than carina; style apex penicillate; capsule oblong; seeds densely sericeous 26. *P. hybrida*
- 6b. Racemes axillary, extra-axillary, or opposite to leaf; lateral petals equaling or shorter than carina; style apex not penicillate; capsule orbicular or obcordate; seeds pubescent.
- 7a. Leaf blade subleathery or thickly papery, lateral veins 3–5 pairs, raised on both surfaces; racemes opposite to leaves; capsule orbicular, emarginate, ca. 6 mm in diam., broadly winged, not ciliate 29. *P. japonica*
- 7b. Leaf blade papery, lateral veins obscure on both surfaces; racemes extra-axillary; capsule obcordate or suborbicular, ca. 4 mm in diam., narrowly winged and ciliate.
- 8a. Leaf blade lanceolate to linear-lanceolate, both surfaces green 27. *P. lhunzeensis*
- 8b. Leaf blade broadly ovate to orbicular, abaxially purple-red, adaxially dark green 28. *P. wexianensis*
- 5b. Filaments united in lower 1/2–2/3, forming an open staminal sheath, upper 1/3–1/2 free.
- 9a. Plants densely hairy with at least some long spreading hairs.
- 10a. Perennial herbs; leaves alternate, elliptic or obovate-elliptic, apex obtuse or retuse; racemes 1.2–2 cm; petals free, apical appendages not stalked 33. *P. crotalarioides*
- 10b. Annual herbs; leaves subopposite, broadly ovate to oblong-elliptic, apex obtuse, mucronate; racemes 0.5–1 cm; petals basally connate, apical appendages stalked 34. *P. subopposita*
- 9b. Plants hairy, hairs curved pubescent, not long, or plant glabrescent.
- 11a. Apex of style extended, obliquely cup-shaped or horseshoe-shaped, stigma 1.
- 12a. Style obliquely cup-shaped, with a terminal tuft of hairs at apex; stem indumentum glandular; leaves in upper branches alternate, lower ones subopposite or pseudowhorled 35. *P. paniculata*
- 12b. Style horseshoe-shaped, not hairy; stem indumentum not glandular; leaves alternate.
- 13a. Slender herbs, prostrate; leaf blade membranous, lanceolate to linear-lanceolate, 10–20 × 2.5–3 mm, both surfaces glabrous; flowers 3.5–4.5 mm; capsule obovoid-ellipsoidal, ca. 2.5 mm in diam. 36. *P. triflora*
- 13b. More robust herbs, erect; leaf blade papery, obovate or elliptic to lanceolate, 2.6–10 × 1–1.5 cm, sparsely pubescent; flowers ca. 4.5 mm; capsule orbicular, ca. 2 mm in diam. 37. *P. chinensis*
- 11b. Apex of style not cup-shaped or horseshoe-shaped, stigmas 2.
- 14a. Annual herbs.
- 15a. Stems slender, narrowly winged or ridged; lower leaves ovate, dense, upper leaves lanceolate to linear-lanceolate, sparse, less than 0.5 cm wide; racemes terminal 38. *P. longifolia*
- 15b. Stems relatively stout, terete; leaves lanceolate or linear-lanceolate, evenly alternate, more than 0.5 cm wide; racemes in forks of branches 39. *P. persicariifolia*
- 14b. Perennial herbs.
- 16a. Leaf blade shiny, lateral veins conspicuous, raised on both surfaces.
- 17a. Stems caespitose, branched or not; leaf blade linear-lanceolate or elliptic-lanceolate, 3–5 mm wide [in Nepal, leaves to 8 mm wide]; racemes terminal or axillary; bracts linear, persistent at flowering; inner sepals ovate-oblong to elliptic-oblong 43. *P. elegans*
- 17b. Stems simple or multibranched; leaf blade lanceolate or elliptic-lanceolate to ovate, 5–10 mm wide; racemes opposite to leaves or axillary; bracts ovate-lanceolate, caducous; inner sepals obovate-oblong 44. *P. bomiensis*

- 16b. Leaf blade not shiny, lateral veins inconspicuous.
- 18a. Stems, branchlets, and inflorescences erect-pubescent; apex of inner sepals acute; capsule narrowly winged 42. *P. sibirica*
- 18b. Stems, branchlets, and inflorescences crisped pubescent; apex of inner sepals mucronate to acuminate; capsule broadly winged.
- 19a. Racemes terminal, 3–6 cm, 7–18-flowered; flowers 7–9 mm; inner sepals obliquely ovate, apex rounded 40. *P. hongkongensis*
- 19b. Racemes opposite to leaves, 1.5–2 cm, 3–8-flowered; flowers ca. 6 mm; inner sepals obovate, apex acuminate, falcate 41. *P. lijiangensis*
- 1b. Sepals caducous after flowering, rarely one outer sepal persistent; keel with apical appendage flabelliform and lobed or lacinate (flowers unknown in *P. oligosperma*).
- 20a. Racemes terminal, pseudoterminal, or opposite to leaf, sometimes a panicle; apical appendage lacinate; unwinged part of capsule usually with obvious concentric ribs; seeds globose, strophiole hooded or helmet-shaped.
- 21a. Scandent shrubs; flowers in terminal panicles 1. *P. tricholopha*
- 21b. Erect shrubs; flowers in terminal, pseudoterminal, or leaf-opposed racemes.
- 22a. Both surfaces of leaf blade glabrous; capsule with 1 maturing seed 2. *P. oligosperma*
- 22b. Both surfaces of leaf blade pubescent, at least on veins; capsule with 2 seeds.
- 23a. Branchlets, petioles, and inflorescence axes glabrous or sparsely pubescent.
- 24a. Leaf blade elliptic, (5–)10–16 × 4.5–6.5 cm, lateral veins 7 or 8 pairs and reticulate veins slightly raised on both surfaces; racemes axillary; capsule reniform, depressed at both ends 6. *P. didyma*
- 24b. Leaf blade obovate to elliptic, (10–)15–19 × 5.5–7 cm, lateral veins 6 or 7 pairs, raised only abaxially, reticulate veins flat; racemes terminal or opposite to leaves; capsule reniform-orbicular, base rounded, depressed only at apex 7. *P. globulifera*
- 23b. Branchlets, petioles, and inflorescence axes densely pubescent.
- 25a. Racemes leaf-opposed; inner sepals oblong to ovate, at right angle to petals, apical appendage stalkless; capsule winged 3. *P. arillata*
- 25b. Racemes terminal; inner sepals obliquely ovate, not at right angle to petals, apical appendage stalked; capsule not winged.
- 26a. Leaf blade lanceolate to elliptic-lanceolate, smaller than 20 × 7 cm; lateral petals oblong, apex nearly truncate, inside glabrous at base; capsule obcordate to orbicular, 1–1.4 cm in diam. 4. *P. fallax*
- 26b. Leaf blade ovate, larger than 25 × 8 cm; lateral petals broadly elliptic, apex rounded, inside barbate at base; capsule broadly ovoid, ca. 1 cm in diam. 5. *P. barbellata*
- 20b. Racemes axillary or terminal, appendage lamellate; unwinged part of capsule without obvious concentric ribs; seeds ovoid or hirsute-villous, not strophiolate, or pubescent and strophiolate.
- 27a. Annual herbs (rarely small shrubs), with corymbose branches from middle of stems; one outer sepal persistent after flowering (*P. tatarinowii* with completely caducous outer sepals).
- 28a. Flowers red or purple-red, keel without conspicuous apical appendage; capsule pubescent; seeds strophiolate, without appendage or tubercle 19. *P. tatarinowii*
- 28b. Flowers yellow, keel with apical appendage; capsule glabrous; seeds normally with strophiole, appendage, and tubercle.
- 29a. Racemes 7–14 cm at fruiting; seeds glabrous.
- 30a. Plant branching from upper part of stem, corymbose, branchlets thin; leaf blade ovate-deltoid or ovate; capsule broadly obcordate, ca. 2 mm across; seeds ovoid, tuberculate or punctate, without wings 25. *P. isocarpa*
- 30b. Plant branching from lower part of stem, branchlets stout; leaf blade ovate; capsule subglobose or subsquare, apex retuse, winged; seeds with appendage.
- 31a. Stem not fleshy; capsule globose or subsquare, ca. 3 mm across; seeds ellipsoidal, exotesta tuberculate, with a black, shiny appendage 23. *P. lacei*
- 31b. Stem fleshy; capsule subglobose, ca. 4 mm across; seeds oblong, smooth, not tuberculate, with a small, white appendage 24. *P. carnosicaulis*
- 29b. Racemes shorter than 5 cm at fruiting; seeds pubescent.
- 32a. Small shrubs; keel with boat-shaped apical appendage 20. *P. bawanglingensis*
- 32b. Annual herbs; keel with bow-shaped or fan-shaped apical appendage.
- 33a. Bracts subulate; inner sepals elliptic, 3–3.5 mm; seeds ellipsoid, tuberculate, with obvious, black, shiny, oblong appendage 21. *P. umbonata*
- 33b. Bracts ovate; inner sepals obovate, ca. 2.5 mm; seeds ovoid, smooth, not tuberculate, without obvious appendage 22. *P. furcata*
- 27b. Shrubs or subshrubs; usually all outer sepals caducous after flowering.
- 34a. Apical appendage of keel peltate or saccate-cucullate; seeds densely hirsute-villous, strophiole absent.

- 35a. Capsule yellowish with raised resiniferous punctate glands; leaves evenly arranged on branchlets 8. *P. resinosa*
 35b. Capsule neither yellowish nor with resiniferous punctate glands; leaves usually concentrated at apices of branchlets.
- 36a. Flowers 5(–8) mm; apical appendage of keel peltate; capsule oblong-obovate, ca. 8 mm, ca. 4 mm in diam. 9. *P. caudata*
 36b. Flowers 12–20 mm; apical appendage of keel 2-cucullate; capsule obovate or cuneate, 10–14 mm, ca. 6 mm in diam. 10. *P. wattersii*
- 34b. Apical appendage of keel shallowly lobed; seeds pubescent, with winged strophiole.
- 37a. Shrubs; leaf blade linear-lanceolate or elliptic-lanceolate; flowers 2–2.5 cm 11. *P. karenium*
 37b. Erect herbs or subshrubs; leaf blade elliptic, obovate, or variously lanceolate; flowers less than 1.5 cm.
- 38a. Petals white or yellow; outer sepals differing in size; middle outer sepal pocketlike or cucullate.
 39a. Petals white or greenish white; flowers at least 15 mm, middle outer sepal and apical appendage of keel cucullate; stems with dense, raised leaf scars and lenticels; leaf blade slightly fleshy, elliptic-obovate to spatulate, 5–6 mm wide, apex obtuse 12. *P. dunniana*
 39b. Petals yellow; flowers ca. 7 mm; middle outer sepal and apical appendage of keel pocketlike; stems without leaf scars and lenticels; leaf blade membranous, elliptic-lanceolate, ca. 3 cm wide, apex acuminate 13. *P. arcuata*
- 38b. Petals pink or purple-red; outer sepals nearly equal, ovate or elliptic, or middle one small and boat-shaped.
- 40a. Outer sepals unequal, middle one small and boat-shaped.
 41a. Keel 2-lamellate; boat-shaped outer sepal not winged on midvein; capsule suborbicular, ca. 4.5 mm in diam.; leaf blade lanceolate or elliptic, 3–12 × 1–3.5 cm 17. *P. hainanensis*
 41b. Keel 4-lamellate; boat-shaped outer sepal narrowly winged on midvein; capsule orbicular to subsquare, ca. 5 mm in diam.; leaf blade obovate or narrowly elliptic, 4.5–9 × 2.5–4.5 cm 18. *P. saxicola*
- 40b. Outer sepals nearly equal, ovate or elliptic.
 42a. Flowers ca. 4 mm, keel with papillate apical appendage; inner sepals obovate to orbicular 14. *P. wuzhishanensis*
 42b. Flowers 6–9 mm, keel with lamellate apical appendage; inner sepals elliptic or elliptic-ovate.
 43a. Keel lamellate, with 3-lobed apical appendage; petals connate in lower 3/4; leaf blade ovate-, obovate-, or elliptic-lanceolate, 3.5–8 × 1.5–2.5 cm, abaxially dark purple, base oblique 15. *P. latouchei*
 43b. Keel 2-lamellate, with 2-lobed apical appendage; petals connate in lower 1/2; leaf blade elliptic, 1.5–4 × 0.6–1.5 cm, abaxially greenish and purplish, base rounded, not oblique 16. *P. koi*

1. *Polygala tricholopha* Chodat, Mém. Soc. Phys. Genève 31(2): 98. 1893.

红花远志 hong hua yuan zhi

Chamaebuxus paniculata Hasskarl; *Polygala hasskarlii* Merrill & Chun.

Shrubs scandent, 1.5–6 m tall. Petiole ca. 5 mm; leaf blade green, shiny, oblong, ovate-oblong, or elliptic-oblong, 6–8 × 2.5–3 cm, papery to subleathery, both surfaces glabrous, midvein raised abaxially, impressed adaxially, lateral veins 9 or 10 pairs, anastomosing near margin, reticulate veins evident, base gradually narrow to subrounded, margin entire, apex acuminate. Panicles terminal, large, branches explanate or drooping, pubescent, apical flowers dense. Pedicel ca. 3 mm. Flowers ca. 1.5 cm. Sepals 5, unequal, caducous after anthesis, ciliate; outer sepals 3, small, upper outer sepal saccate, (5–)7 mm, lateral sepals reniform, ca. 3 × 5 mm; inner sepals 2, purple-red, petaloid, elliptic, ca. 15 × 8 mm, much veined, apex acute. Petals 3, connate in lower 2/3, yellow; lateral petals obliquely oblong, ca. 1.1 cm, inside densely bunched villous at base, apex subtruncate, retuse; keel nearly equaling lateral petals, cucullate, apex with much-lobed, cristate, stalked appendage. Stamens 8; filaments ca. 1 cm, lower 3/5 united, forming an open staminal sheath, ciliate;

anthers ovoid. Disk annular. Ovary ovoid, ca. 2 mm in diam., narrowly winged and ciliate; style ca. 8 mm, upward gradually thickened, apex shallowly 2-lobed, lobes differing in size; stigma adnate to lower lobe. Capsules broadly ellipsoidal or reniform, ca. 8 mm, ca. 1.4 cm in diam., broadly winged, prominently ribbed, apex slightly retuse, with a rostrate acumen; carpel suborbicular, thinly ribbed. Seeds black, globose, spur-shaped; strophiole helmet-shaped. Fl. Jul–Aug, fr. Aug–Sep.

Forests, margins of woods on mountain slopes; (300–)1300–1700 m. Guangxi, Hainan, SW Yunnan (Ruili) [India, Laos, Thailand, Vietnam].

2. *Polygala oligosperma* C. Y. Wu, Acta Bot. Yunnan. 2: 81. 1980.

少籽远志 shao zi yuan zhi

Shrubs ca. 4 m tall. Branchlets terete, glabrous. Petiole ca. 1 cm, pubescent, sulcate adaxially; leaf blade green, lanceolate to elliptic-lanceolate, 16–19 × 4–5 cm, papery, both surfaces glabrous, midvein raised abaxially, sulcate adaxially, lateral veins 9–12 pairs, anastomosing near margin, raised abaxially, reticulate veins distinct, base obtuse to rounded, apex acuminate. Racemes terminal or axillary, glabrous, 13–14 cm at fruiting, drooping. Flowers not seen. Fruit paired, purple-red, reniform,

ca. 9 mm in diam., broadly winged, without persistent sepals, apex retuse. Capsules rugose-striate. Seeds 2, only 1 reaching maturity, black, globose, glabrous; strophiole helmet-shaped. Fl. unknown, fr. Mar.

- Sparse forests, shrub forests on slopes of hills. S Yunnan (Menghai).

3. *Polygala arillata* Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 199. 1825.

荷包山桂花 he bao shan gui hua

Polygala arillata var. *ovata* Gagnepain.

Shrubs or small trees, 1–5 m tall. Branchlets sometimes weakly ridged, densely pubescent; terminal buds densely yellow-brown felted-hairy. Petiole ca. 1 cm, pubescent; leaf blade green, elliptic or oblong-elliptic to oblong-lanceolate, 6.5–14 × 2–2.5 cm, papery, both surfaces sparsely pubescent especially on veins, glabrescent, midvein raised abaxially, depressed adaxially, lateral veins 5 or 6 pairs, anastomosing near margin, veinlets reticulate, evident, base cuneate or obtuse, margin entire, ciliate, apex acuminate. Racemes opposite to leaves, drooping, densely pubescent, 7–10 cm, to 25(–30) cm at fruiting. Pedicel ca. 3 mm, pubescent; bract 1, basal, triangular-acuminate. Flowers 1.3–2 cm. Sepals 5, unequal, ciliate, caducous after anthesis; outer sepals 3, small, upper one deeply cucullate, 8–9 mm, lateral sepals ovate, ca. 5 × 3 mm, apex rounded; inner sepals 2, red-purple, petaloid, oblong-obovate, 1.5–1.8 cm, nearly at right angle between them and petals. Petals 3, connate in lower 2/3, yellow, slightly fleshy; keel longer than lateral petals, apex with multifid appendages. Stamens 8; filaments ca. 1.4 cm, lower 2/3 united, forming an open staminal sheath, adnate with petals; anthers ovoid. Disk fleshy. Ovary compressed globose, ca. 3 mm in diam., narrowly winged, ciliate; style 8–12 mm, curved toward apex, apex 2-lobed; stigma on lower lobes. Capsule purple-red at maturity, baccate, broadly reniform or slightly cordate, ca. 1 cm, ca. 1.3 cm in diam., margin winged, ciliate, apex emarginate, mucronate; carpels with concentric circles costate. Seeds brown-red to black, globose, ca. 4 mm in diam., very sparsely pubescent, truncate at hiliferous end, shiny, with large helmet-shaped, somewhat irregular, projecting strophiole. Fl. May–Oct, fr. Jun–Nov.

Forests, forest margins on mountain slopes; (700–)1000–2800 (–3000) m. Anhui, Fujian, Guangxi, Guizhou, Henan, Hubei, Jiangxi, S Shaanxi, Sichuan, Xizang, Yunnan, Zhejiang [Bhutan, Cambodia, India (Darjeeling, Sikkim), Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam].

Material with ovate leaves has been separated as *Polygala arillata* var. *ovata* (in Lecomte, Fl. Indo-Chine, Suppl. 1: 231. 1939); however, leaf shape, along with other characters, is very variable in *P. arillata*. Thus this variety, along with *P. arillata* var. *laevicarpa* R. N. Banerjee & G. S. Giri (Candollea 42(2): 55. 1987) described from Nepalese material, does not warrant recognition.

4. *Polygala fallax* Hemsley, J. Linn. Soc., Bot. 23: 59. 1886.

黄花倒水莲 huang hua dao shui lian

Polygala aureocauda Dunn; *P. fallax* Hayek ex Zahlbruckner (1900), not Hemsley (1886), nor Chodat (1889); *P. forbesii* Chodat.

Shrubs or small trees, 1–3 m tall. Roots stout, multi-branched, outside yellowish. Branchlets gray-green, densely explanate, pubescent. Petiole 9–14 mm, pubescent, sulcate adaxially; leaf blade green, lanceolate to elliptic-lanceolate, 8–17(–20) × 4–6.5 cm, membranous, both surfaces pubescent, midvein raised abaxially, impressed adaxially, lateral veins 8 or 9 pairs, raised abaxially, anastomosing near margin, reticulate veins distinct, base cuneate to obtuse, margin entire, apex acuminate. Racemes terminal or axillary, 10–15 cm, pubescent; bracteoles caducous, basal, linear-oblong. Sepals 5, ciliate, caducous after anthesis; outer sepals 3, small, unequal, upper one helmet-shaped, 6–7 mm, other 2 ovate to elliptic, ca. 3 mm; inner sepals 2, petaloid, obliquely obovate, large, ca. 1.5 × 0.7–0.8 cm, base attenuate, apex rounded. Petals 3, connate in lower 2/3, yellow; lateral petals oblong, ca. 1 cm, inside glabrous at base, apex nearly truncate; keel hooded, ca. 1.2 cm, apex with fimbriate appendages, with stalk ca. 3 mm. Stamens 8, 1–1.1 cm, lower 2/3 united forming an open staminal sheath; anthers ovoid. Disk annular. Ovary globose, compressed, 3–4 mm in diam., ciliate; style 8–9 mm, thin, apex tubiform, shallowly 2-lobed; stigma with short stalk. Capsule green-yellow, broadly orbiculate to orbicular or obovoid, 1–1.4 cm in diam., not winged and eciliate; carpels with concentric circles costate. Seeds 2, brown-black, globose, ca. 4 mm in diam., densely white pubescent; strophiole hooded, apex convex. Fl. May–Aug, fr. Aug–Oct.

- Forests, streamsides, moist areas in valleys; (400–)1200–1700 m. Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangxi, Yunnan.

5. *Polygala barbellata* S. K. Chen, Acta Bot. Yunnan. 2: 83. 1980.

髯毛远志 ran mao yuan zhi

Shrubs, small, ca. 1.5 m tall. Branchlets densely tomentose. Petiole ca. 1.5 cm, densely tomentose, adaxially slightly depressed; leaf blade green, obovate, 24–32 × 8.5–9.8 cm, membranous, tomentose (sometimes only slightly so and only on veins), midvein raised abaxially, impressed adaxially, lateral veins 15–17 pairs, anastomosing near margin, veinlets reticulate, base broadly cuneate, margin entire, apex acuminate. Racemes terminal, 4.5–6 cm; peduncles densely tomentose. Flowers concentrated together, forming a golden towerlike inflorescence. Pedicel ca. 2 mm. Sepals 5, ciliate, unequal, caducous at anthesis; outer sepals 3, small, upper one cucullate, ca. 8 mm, lateral sepals ovate, ca. 4 × 3.2 mm; inner sepals 2, petaloid, obliquely ovate, large, ca. 15 × 7 mm, base attenuate, apex obtuse. Petals 3, connate in lower 2/3, yellow-red; lateral petals broadly ovate, ca. 1.4 cm, with fascicled barb inside at base, apex rounded; keel hooded, ca. 1.5 cm, apex appendages with stalk ca. 3 mm. Stamens 8; filaments ca. 1.4 cm, lower 2/3 united forming an open staminal sheath; anthers clavate. Ovary broadly ovoid, ca. 2 mm, ca. 2.5 mm in diam., winged, ciliate; style ca. 1 cm, apex slightly inflated, bilabiate. Capsule broadly ovoid, ca. 1 cm in diam.; carpels ribbed, ciliate. Seeds brown, globose, ca. 4 mm in diam., pubescent, strophiolate. Fl. Aug–Sep, fr. Oct–Nov.

- Open forests, damp places on mountain slopes; ca. 1100 m. SE Yunnan (Pingbian).

One of us (Parnell) suggests that this may be synonymous with *Polygala tonkinensis* Chodat; however, two of us (Chen and Ma) re-

gard *P. barbellata* as a different species from *P. tonkinensis*, which is treated as a synonym of *P. arillata* (Fl. Malaysia).

6. *Polygala didyma* C. Y. Wu, Acta Bot. Yunnan. 2: 82. 1980.

肾果远志 shen guo yuan zhi

Shrubs or small trees, ca. 4.5 m tall. Branchlets slender, pubescent. Petiole ca. 1 cm, pubescent, sulcate adaxially; leaf blade green, elliptic, (5–)10–16 × 4.5–6.5 cm, thinly papery, glabrous, except on veins on both surfaces, midvein raised abaxially, impressed adaxially, lateral veins 7 or 8 pairs, raised on both surfaces, anastomosing near margin, veinlets reticulate, slightly raised on both surfaces, base obtuse, margin entire, apex acuminate. Racemes extra-axillary, ca. 9 cm, slender, glabrous. Flowers yellow. Perianth not seen. Young fruit reniform, ca. 8 mm, ca. 1.3 cm in diam., glabrous, both ends depressed, base cordate, with disk, margin narrowly winged, apex retuse. Seeds not seen. Fl. and fr. Aug–Oct.

• Forests on mountain slopes; 1200–1300 m. NW Yunnan (Gongshan).

7. *Polygala globulifera* Dunn, J. Linn. Soc., Bot. 35: 486. 1903.

球冠远志 qiu guan yuan zhi

Shrubs 0.8–2.5 m tall. Branchlets glabrous or pubescent. Petiole ca. 1 cm, pubescent; leaf blade green, obovate or elliptic, (10–)15–19 × 5.5–7 cm, membranous or thinly papery, nearly glabrous but pubescent on veins on both surfaces, midvein raised abaxially, impressed adaxially, lateral veins 6 or 7 pairs, raised abaxially, anastomosing near margin, veinlets reticulate, flat, base rounded or broadly cuneate, margin entire, minutely ciliate, apex acuminate. Racemes terminal or opposite to leaves, 6–12 cm or 35–40 cm, very shortly pubescent or glabrous. Flowers dense. Pedicel 8–12 mm, glabrous or pubescent; bracts 3, caducous, lanceolate. Sepals 5, unequal, ciliate, caducous at anthesis; outer sepals 3, small, upper one saccate, 7–8 mm, lateral sepals ovate, 3–4 × ca. 3 mm; inner sepals 2, petaloid, obliquely obovate, large, 1.1–1.4 cm × ca. 7 mm. Petals 3, connate in lower 2/5; lateral petals obliquely oblong, ca. 1 cm, apex rounded; keel ca. 1.2 cm, apex with fan-shaped, lobed, revolute, globose appendages. Stamens 8; filaments ca. 1.1 cm, lower 2/3 united, forming an open staminal sheath adnate with petals; anthers oblong. Disk annular. Ovary broadly ovoid, ca. 2 mm, ca. 2.5 mm in diam., winged, ciliate; style 8–10 mm, thin, apically slightly thickening, curved, apex shallowly 2-lobed; stigma on lower lobe. Capsule red, reniform, ca. 8 mm, ca. 1.2 cm in diam., margin broadly winged, apex depressed, mucronate, wing with transverse veins, carpels with concentric ribs. Seeds globose, ca. 6 mm in diam., glabrous; strophiole ca. 1/2 as long as seed. Fl. Aug–Oct, fr. Oct–Nov.

Sparse forests, forest margins, shrub forests on mountain slopes; 1000–1500 m. SE Xizang, Yunnan [N India, Myanmar].

- 1a. Leaf blade obovate or elliptic; racemes 6–12 cm 7a. var. *globulifera*
 1b. Leaf blade ovate or ovate-lanceolate; racemes 35–40 cm 7b. var. *longiracemosa*

7a. *Polygala globulifera* var. *globulifera*

球冠远志(原变种) qiu guan yuan zhi (yuan bian zhong)

Leaf blade obovate or elliptic. Racemes 6–12 cm, very shortly pubescent. Strophiole ca. 1/2 as long as seed. Fl. Aug–Oct, fr. Oct–Nov.

• Sparse forests, forest margins, shrub forests on mountain slopes; 1000–1500 m. S and SW Yunnan.

7b. *Polygala globulifera* var. *longiracemosa* S. K. Chen, Acta Bot. Yunnan. 2: 83. 1980.

长序球冠远志 chang xu qiu guan yuan zhi

Polygala arillata Buchanan-Hamilton ex D. Don f. *kachinensis* Mukerjee; *P. globulifera* var. *kachinensis* (Mukerjee) R. N. Banerjee.

Leaf blade ovate or ovate-lanceolate. Racemes 35–40 cm, glabrous. Seed nearly completely surrounded by strophiole.

Forests, shrub forests on mountain slopes; 1100–1400 m. SE Xizang (Médog), NW Yunnan (Gongshan) [N India, Myanmar].

8. *Polygala resinosa* S. K. Chen, Acta Bot. Yunnan. 2: 78. 1980.

斑果远志 ban guo yuan zhi

Shrubs, smaller than 1 m tall. Stems and branchlets terete, longitudinally thinly angular and yellowish, shiny, leaf scars crescent-shaped, corky; terminal buds pubescent. Leaves evenly alternate; petiole 1–1.5 cm, adaxially sulcate; leaf blade abaxially gray-white, adaxially green, lanceolate, 6–12 × 1.5–3 cm, thickly papery, abaxially glabrous, adaxially very shortly transparently setose near margin, midvein raised abaxially, impressed adaxially, lateral veins 7 or 8 pairs, anastomosing near margin, base cuneate, margin entire, slightly recurved, apex long acuminate. Racemes pseudoterminal, simple, ca. 13 cm at fruiting. Flowers not seen. Capsule yellowish, obovoid-cuneate, ca. 7 mm, ca. 4 mm in diam.; carpels very yellow, translucently resiniferous punctate, base with annular disk, margin narrowly winged, apex retuse, mucronate; fruit stalk ca. 5 mm. Seeds ovoid, ca. 1.5 mm in diam., densely yellowish to white villous, hiliferous end with a brown, curved appendage, not strophiole. Fl. unknown, fr. Sep–Nov.

• Sparse forests on mountain slopes; ca. 1000 m. SW Guangxi (Longzhou).

9. *Polygala caudata* Rehder & E. H. Wilson in Sargent, Pl. Wilson. 2: 161. 1914.

尾叶远志 wei ye yuan zhi

Polygala comesperma Chodat; *P. watersii* Hance (1882), not Hance (1881).

Shrubs 1–3 m tall. Young branchlets longitudinally angular and sulcate, yellow pubescent, glabrescent. Leaves alternate, usually congested at apices of branchlets; petiole 5–10 mm, sulcate adaxially; leaf blade green, oblong or oblanceolate, rarely ovate-lanceolate, 3–12 × 1–3 cm, subleathery, both surfaces glabrous, midvein raised abaxially, impressed adaxially, lateral veins 7–12 pairs, raised abaxially, obscure adaxially, anastomosing near margin, reticulate veins indistinct, base attenuate to cuneate, margin entire, slightly recurved, undulate, apex caudate-acuminate or long acuminate. Racemes terminal or

axillary at apices of branchlets, several together corymbose or paniculate, 2.4–5(–7) cm, connate pubescent. Pedicel 1–1.5 mm, glabrous; basal bracteoles 3, caducous, deltoid-ovate. Flowers small, 5(–8) mm. Sepals 5, unequal, ciliate, caducous at anthesis; outer sepals 3, ovate, ca. 2 × 1.5 mm, outside pubescent, apex rounded; inner sepals 2, petaloid, obovate to obliquely obovate, large, 4.5(–6) × ca. 3 mm, 3-veined, base attenuate, apex retuse-rounded. Petals 3, connate in lower 3/4, white, yellow, or purple; keel longer than lateral petals, ca. 5 mm, apex with peltate appendages. Stamens 8; filaments ca. 4 mm, lower 3/4 united, forming an open staminal sheath; anthers ovoid. Disk annular. Ovary obovoid, ca. 0.8 mm in diam.; style thickening from base to apex, apex curved and 2-lobed; stigma in lower lobe. Capsule oblong-obovoid, ca. 8 mm, ca. 4 mm in diam., base attenuate, with annular disk, margin narrowly winged, apex retuse. Seeds brown-black, ovoid, ca. 1.5 mm, ca. 1 mm in diam., densely red-brown villous, hiliferous end brown-black convex. Fl. Nov, fr. May–Dec.

• Forests on limestone mountains; 1000–1800(–2100) m. Guangdong, Guangxi, Guizhou, Hubei, Sichuan, Yunnan.

10. *Polygala wattersii* Hance, J. Bot. 19: 209. 1881.

长毛籽远志 chang mao zi yuan zhi

Polygala mariesii Hemsley.

Shrubs or small trees, 1–4 m tall. Branchlets terete, longitudinally angular and sulcate, glandular-pubescent when young. Leaves congested at apices of branchlets; petiole 6–10 mm, adaxially sulcate; leaf blade elliptic, elliptic-lanceolate, or oblanceolate, 4–10 × 1.5–3 cm, subleathery, both surfaces glabrous, midvein raised abaxially, impressed adaxially, lateral veins 8 or 9 pairs, slightly raised abaxially, evident adaxially, anastomosing near margin, reticulate veins absent, base attenuate to cuneate, margin entire, undulate, apex acuminate to caudate. Racemes 2–5, several axillary at apices of branchlets, 3–7 cm, shortly white glandular-hairy. Flowers sparse, 1.2–2 cm. Pedicel ca. 6 mm; basal bracteoles 3, caducous. Sepals 5, unequal, caducous at anthesis; outer sepals 3, ovate, 2–3 × 1.5–2 mm, apex obtuse, ciliate; inner sepals 2, petaloid, obovate, ca. 1.3 cm, base attenuate, ciliate or not, apex rounded, concave. Petals 3, connate in lower 3/4, yellow, rarely white or purple-red; lateral petals shorter than keel, apex truncate; keel ca. 1.5 cm, apex with 2 cucullate appendages. Stamens 8; filaments ca. 1.5 cm, lower 3/4 united, forming an open staminal sheath adnate with petals; anthers narrowly ovoid. Ovary obovoid, 1.5–2 mm, ca. 1.5 mm in diam.; style ca. 1.2 cm, apically thickening and curved, apex shallowly 2-lobed; stigma in lower lobe. Capsule obovoid or cuneate, 1–1.4 cm, ca. 6 mm in diam., base attenuate, margin winged, apex retuse, mucronate, wing with transverse veins. Seeds brown-black, ovoid, ca. 2 mm, ca. 1.5 mm in diam., brown or white villous, hairs ca. 7 mm; strophiole absent. Fl. Apr–Jun, fr. May–Jul.

Broad-leaved forests, shrub forests on limestone mountains; 1000–1500 m. Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangxi, Sichuan, Xizang, Yunnan [N Vietnam].

11. *Polygala karensium* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 392. 1872.

密花远志 mi hua yuan zhi

Shrubs 0.5–2 m tall. Young branchlets thin, pubescent, glabrescent. Petiole 2–2.5 cm, glabrous or shortly strigose; leaf blade green, linear-lanceolate to elliptic-lanceolate, rarely elliptic, 7–12(–18) × 1.5–4(–6) cm, membranous to thinly papery, abaxially glabrous, adaxially sparsely hispidulous, midvein raised abaxially, impressed adaxially, lateral veins 6 or 7 pairs, anastomosing near margin, veinlets indistinct, base attenuate to cuneate, rarely rounded, margin entire, sometimes slightly undulate, apex acuminate, mucronate. Racemes numerous, terminal or axillary, 4–5 cm, to 10 cm at fruiting, pubescent, glabrescent; bracteoles triangular, ca. 5 mm. Flowers dense, large, 2–2.5 cm. Sepals 5, unequal, caducous at anthesis; outer sepals 3, small, upper one inflexed, ca. 4 mm, apex obtuse; inner sepals 2, petaloid, obovate, large, 16–19 × ca. 5 mm, base attenuate, apex rounded. Petals 3, connate in lower 3/4, white with purple to pink, transparent; lateral petals oblong, 2–2.5 cm, apex truncate to rounded; keel cucullate, apex with appendages 2-fascicled, 2- or 3-lobed. Stamens 8; filaments 2–2.2 cm, lower 3/4 united, forming an open staminal sheath; anthers ovoid. Disk annular. Ovary obovoid, ca. 2 mm in diam., winged; style 1.7–1.8 cm, from base toward apex gradually broadening and curved, apex 2-labiate; stigma in labium. Capsule quadrangular-ellipsoidal or obcordate, 8–9 mm in diam., broadly winged, base with disk and scars of perianth, apex retuse, mucronate, wing 1.5–2 mm wide and ribbed. Seeds black, ovoid, ca. 1.5 mm in diam., tuberculate, pubescent; strophiole irregularly lobed, winged, translucent and projecting apically. Fl. Dec–Apr, fr. Mar–Jul.

Open forests or shrub forests on mountain slopes, damp forest soils, slopes on hills; 1000–2500 m. Guangxi, Xizang, Yunnan [Bhutan, Myanmar, Thailand, Vietnam].

- 1a. Capsule quadrangular-ellipsoidal; leaf blade linear-lanceolate or elliptic-lanceolate; inner sepals glabrous 11a. var. *karensium*
 1b. Capsule obcordate; leaf blade lanceolate, very small; inner sepals hairy 11b. var. *obcordata*

11a. *Polygala karensium* var. *karensium*

密花远志(原变种) mi hua yuan zhi (yuan bian zhong)

Polygala congesta Rehder & E. H. Wilson; *P. floribunda* Dunn (1903), not Benthams (1840), nor Boissier & Hoet (1856); *P. lancilimba* Merrill; *P. tricornis* Gagnepain; *P. tricornis* var. *crinita* Gagnepain; *P. tricornis* var. *latifolia* Gagnepain; *P. yunnanensis* Chodat.

Leaf blade linear-lanceolate or elliptic-lanceolate, rarely elliptic, 7–12(–18) × 1.5–4(–6) cm. Inner sepals glabrous. Capsule quadrangular-ellipsoidal, 8–9 mm in diam. Fl. Dec–Apr, fr. Mar–Jun.

Open forests or shrub forests on mountain slopes; 1000–2500 m. Guangxi, Xizang, Yunnan [Bhutan, Myanmar, N Vietnam].

11b. *Polygala karensium* var. *obcordata* (C. Y. Wu & S. K. Chen) S. K. Chen & J. Parnell, **comb. nov.**

小叶密花远志 xiao ye mi hua yuan zhi

Basionym: *Polygala tricornis* Gagnepain var. *obcordata* C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 83. 1980.

Leaf blade lanceolate. Inner sepals thickly pilose or glandular-punctate when young, basally very narrow. Capsule obcordate, small.

• Damp forest soils, slopes on hills; 1600–2300 m. W Yunnan (Lincang, Longling).

12. *Polygala dunniana* H. Léveillé, Repert. Spec. Nov. Regni Veg. 9: 326. 1911.

贵州远志 *gui zhou yuan zhi*

Perennial herbs or subshrubs, 5–10 cm tall. Stems and branches terete; young branchlets pubescent, with dense rounded raised leaf scars and lenticels. Petiole ca. 6 mm, winged; leaf blade green, elliptic-obovate or spatulate, 1–1.5 × 0.5–0.8 cm, thickly papery (or slightly fleshy), abaxially slightly scabrous, glabrous, adaxially densely white hispidulous near margin, midvein raised abaxially, slightly impressed adaxially, lateral veins 2 or 3 pairs, only evident abaxially, base decurrent, cuneate, margin entire, apex obtuse, mucronate. Racemes terminal, few flowered. Flowers large, ca. 1.8 cm. Pedicel ca. 6 mm, pubescent. Sepals 5, unequal, caducous at anthesis; outer sepals 3, glabrous, upper one cucullate, ca. 6 mm, lateral ones oblong, ca. 4 × 2 mm, base oblique, apex obtuse; inner sepals 2, petaloid, elliptic-oblong, ca. 14 × 6 mm, 3–5-veined, base clawed, apex rounded. Petals 3, connate in lower 2/3, white to greenish white; lateral petals oblong, ca. 1.5 cm; keel ca. as long as or longer than lateral petals, apex with 4 fingerlike appendages. Stamens 8; filaments ca. 1.4 cm, lower 3/4 united, forming an open staminal sheath adnate with petals; anthers ovoid. Ovary broadly oblong, ca. 1.5 mm in diam., winged, with short stalk; style ca. 1.3 cm, apex 2-lobed, lobes deltoid; stigma in lobes. Fruit not seen. Fl. Jul–Sep, fr. unknown.

• Mixed *Pinus* and *Quercus* forests, open mountain slopes; ca. 1900 m. Guizhou, Yunnan.

13. *Polygala arcuata* Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25(19): 54. 1908.

台湾远志 *tai wan yuan zhi*

Polygala crassiuscula Hayata.

Subshrubs ca. 30 cm tall, glabrous except for pubescent young branchlets. Stems usually solitary, woody. Petiole ca. 1 cm; leaf blade abaxially glaucescent, adaxially green, elliptic-lanceolate, ca. 10 × 3 cm, membranous, slightly thick, lateral veins 4 or 5 pairs, arched, anastomosing near margin, base attenuate, apex acuminate. Racemes axillary at apices of branchlets or terminal, 5–6 cm, densely flowered. Pedicel ca. 2 mm. Flowers ca. 7 mm. Sepals 5; outer sepals 3, unequal, upper one rounded-saccate, ca. 3 mm, lateral ones orbicular, ca. 1.5 mm, base oblique; inner sepals 2, obliquely oblong, petaloid, ca. 5.5 mm. Petals 3, connate in lower 3/4, yellow; lateral petals ca. 7 mm, apex rounded; keel cucullate, apex with 2 saccate thickened appendages. Ovary glabrous, shortly stalked; style thickened toward apex; stigma in lower lobes. Capsule obovoid-reniform or broadly orbicular, ca. 4 mm, ca. 5 mm in diam.; carpels membranous, not winged, apex retuse. Seeds ovoid, ca. 2 mm, villous; strophiole ca. 1.2 mm. Fl. and fr. unknown.

• About 1700 m. Taiwan (Nantou).

This is a rare species requiring conservation efforts.

14. *Polygala wuzhishanensis* S. K. Chen & J. Parnell, **nom. nov.**

海岛远志 *hai dao yuan zhi*

Replaced synonym: *Polygala insularis* Chun & F. C. How ex C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 80. 1980, not *Polygala insularis* A. W. Bennett, J. Bot. 17: 204. 1879.

Herbs or subshrubs, erect, 10–20 cm tall. Stems woody, with elliptic, raised leaf scars; young branchlets curved pubescent. Petiole 3–4 mm, pubescent; leaf blade green, lanceolate to ovate-lanceolate, 2–4 × ca. 1.5 cm, papery, abaxially glabrous, adaxially pellucid hispidulous, midvein raised abaxially, slightly impressed adaxially, lateral veins 3–5 pairs, assurgent, anastomosing near margin, veinlets indistinct, base obtuse, margin entire, apex obtuse, mucronate. Racemes terminal, ca. 1 cm, pubescent, with few, dense flowers; basal bract 1, linear. Flowers ca. 4 mm. Sepals 5, caducous, unequal, glabrous; outer sepals 3, nearly equal, broadly ovate, ca. 1.5 × 1.2 mm, apex obtuse; inner sepals 2, petaloid, broadly obovate or suborbicular, ca. 5 × 4 mm, 5-veined, apex rounded. Petals 3, pink, connate in lower 1/2, nearly equal; keel cucullate, apex with papillate appendages. Stamens 8; filaments ca. 3 mm, lower 5/6 united, forming an open staminal sheath. Ovary obcordate, ca. 1.5 mm in diam., winged; style curved, similarly hooklike, apex expanded tubiform; stigma at lower margin of tube. Capsule obovoid, ca. 4 mm in diam., broadly winged, apex incised. Seeds not seen. Fl. Oct.

• On rocks in forests; ca. 1800 m. Hainan (Wuzhi Shan).

15. *Polygala latouchei* Franchet, Bull. Soc. Bot. France 46: 206. 1899.

大叶金牛 *da ye jin niu*

Polygala nimborum Dunn.

Subshrubs 10–20 cm tall. Stems and branchlets terete, pubescent, with rounded, raised, yellow-brown leaf scars below middle. Leaves crowded on upper part of branches; petiole 5–7 mm, pubescent, narrowly winged; leaf blade abaxially reddish or dark purple, adaxially green, ovate-lanceolate to obovate or elliptic-lanceolate, 3.5–8 × 1.5–2.2(–2.5) cm, papery, abaxially glabrous, adaxially sparsely to densely white setose, midvein slightly raised on both surfaces, lateral veins 4 or 5 pairs, curved, anastomosing along margin, veinlets reticulate, indistinct, base rounded, oblique, both sides differing in size, apex acute, mucronate. Racemes terminal or axillary at several leaves at apices of branches, 3–6 cm, pubescent, densely flowered. Pedicel 2–3 mm; basal bract 1, caducous, ovate-lanceolate, ca. 5 mm, setose, ciliate. Sepals 5, caducous, glabrous; outer sepals 3, ovate, ca. 1.5 × 1 mm, apex obtuse; inner sepals 2, petaloid, elliptic, ca. 5 × 2 mm, 3-veined, apex obtuse. Petals 3, connate in lower 3/4, pink to purple-red, membranous; lateral petals narrowly elliptic, ca. 8 mm, apex rounded; keel shorter than lateral petals, 2-lamellate, apex with 3-lobed appendages. Stamens 8; filaments ca. 5 mm, lower 4/5 united, forming an open staminal sheath; anthers ovoid. Ovary obovoid, narrowly winged, ca. 1 mm in diam., glabrous; style ca. 4 mm, apex slightly thickened, slightly lobed. Capsule suborbicular, ca. 4

mm in diam., winged, apex incised and mucronate. Seeds black, ovoid, ca. 2 mm, ca. 1.2 mm in diam., tuberculate, white pilose; strophiole wing-shaped, yellow-brown, equaling or longer than seeds. Fl. Mar–Apr, fr. Apr–May.

• Forests, rocky areas, grasslands, mountain slopes; (100–)700–1300 m. Fujian, Guangdong, Guangxi, Jiangxi, Zhejiang.

16. *Polygala koi* Merrill, Sunyatsenia 1: 196. 1934.

曲江远志 qu jiang yuan zhi

Subshrubs, erect or prostrate, 5–10 cm tall. Stems terete, woody, with semicircular leaf scars, glabrous or young parts adnate-pubescent. Petiole 5–10 mm, glabrous; leaf blade abaxially green with purple, adaxially green, elliptic, 1.5–4 × 0.6–1.5(–2) cm, ± fleshy, abaxially glabrous, adaxially glabrous or white setose along margin, midvein slightly raised abaxially, impressed adaxially, lateral veins 3 pairs, obscure, base cuneate or subrounded, margin entire, apex obtuse or rounded, mucronate. Racemes terminal, 2.5–3 cm, axis of inflorescence pubescent. Flowers numerous, dense. Pedicel ca. 2 mm, glabrous; basal bract 1, persistent, oblong-ovate, ca. 2 mm, apex acuminate, ciliate. Sepals 5, caducous; outer sepals 3, elliptic, ca. 3 mm, glabrous, apex obtuse; inner sepals 2, elliptic-ovate, ca. 7 × 3.5 mm, 5-veined, apex rounded. Petals 3, connate in lower 1/2, purple-red, ca. 9 mm; lateral petals nearly equaling keel, apex rounded; keel apex with deeply 2-lobed lamellate appendages. Stamens 8; filaments ca. 7 mm, lower 5/7 united, forming an open staminal sheath; anthers ovoid. Ovary globose, ca. 1 mm in diam., winged, glabrous; style ca. 7 mm, gradually thickened from base toward apex, curved, apex tubiform, 2-lobed; stigma in lower lobe. Capsule orbicular, ca. 3 mm in diam., base with disk and scars of perianth, winged, apex incised. Seeds not seen. Fl. Apr–Sep, fr. Jun–Oct.

• On rocks in broad-leaved forests; 700–900 m. Guangdong, Guangxi, Hunan.

17. *Polygala hainanensis* Chun & F. C. How, Acta Phytotax. Sin. 7: 5. 1958.

海南远志 hai nan yuan zhi

Subshrubs, erect or repent, 15–45 cm tall. Stems simple or with few branches, base woody, upper part herbaceous, sparsely powdery pilose. Petiole 1–1.5 cm, pubescent; leaf blade green, elliptic-oblong or lanceolate, 3–12 × 1–3.5 cm, thinly papery, both surfaces glabrous or sparsely adnate pilose adaxially, or densely strigose on both surfaces, midvein raised abaxially, impressed adaxially, lateral veins 6–9 pairs, raised on both surfaces, curved, anastomosing near margin, veinlets reticulate, obscure, base broadly cuneate, margin entire, ciliate, apex acuminate, mucronate. Racemes terminal, 1.5–7.5 cm, powdery pilose. Flowers dense. Pedicel 1.5–2 mm, glabrous; basal bracteole 1, caducous, ca. 2 mm. Sepals 5, caducous; outer sepals 3, unequal, small, upper one boatlike, 3–3.5 mm, apex obtuse, lateral ones oblong, ca. 1.7 mm; inner sepals 2, petaloid, obovate, ca. 6 × 3.5 mm, 7-veined, base attenuate, unguulate, apex rounded. Petals 3, connate in lower 2/3, white, rosy, or purple; lateral petals obovate-oblong, ca. 6 mm, apex obtuse; keel slightly longer than lateral petals, cucullate, 2-lamellate, apex with 2-lobed appendages. Stamens 8; filaments ca. 6 mm,

lower 2/3 united, forming an open staminal sheath, and adnate with petals; anthers ovoid. Ovary globose, 1–1.5 mm in diam., narrowly winged, glabrous; style 4–5 mm, upper part curved, apex hooked; stigma at lower margin of hook. Capsule green, suborbicular, ca. 4.5 mm in diam., winged, apex incised, wing with transverse veins. Seeds black, ovoid, ca. 2 mm in diam., white pubescent; strophiole membranous. Fl. Apr–Nov, fr. Aug–Oct.

• Evergreen broad-leaved forests, valley forests; 300–900 m. Hainan.

- 1a. Leaves glabrous on both surfaces or only sparsely adnate pilose 17a. var. *hainanensis*
 1b. Leaves densely strigose on both surfaces 17b. var. *strigosa*

17a. *Polygala hainanensis* var. *hainanensis*

海南远志(原变种) hai nan yuan zhi (yuan bian zhong)

Leaf blade elliptic-oblong or lanceolate, 3–12 × 1–3.5 cm, both surfaces glabrous or only sparsely adnate pilose. Fl. Apr–Sep, fr. Aug–Oct.

• Evergreen broad-leaved forests; 800–900 m. Hainan.

17b. *Polygala hainanensis* var. *strigosa* Chun & F. C. How, Acta Phytotax. Sin. 7: 7. 1958.

粗毛海南远志 cu mao hai nan yuan zhi

Leaf blade densely strigose on both surfaces, especially dense adaxially. Fl. and fr. Oct–Nov.

• Valley forests; 300–500 m. Hainan (Baoting).

18. *Polygala saxicola* Dunn, J. Linn. Soc., Bot. 35: 486. 1903.

岩生远志 yan sheng yuan zhi

Herbs erect or stoloniferous subshrubs, 5–10 cm tall. Stems and branches longitudinally angular, pubescent. Petiole ca. 5 mm, pubescent; leaf blade green, obovate or elliptic, 4.5–9 × 2.5–4.5 cm, papery, abaxially scabrous, glabrous, adaxially white setose, midvein raised abaxially, impressed adaxially, lateral veins 6 or 7 pairs, raised abaxially, anastomosing near margin, veinlets reticulate, raised abaxially, base broadly cuneate to subrounded, margin entire, apex obtuse-rounded, mucronate. Racemes 1–3, terminal, 3–6 cm, pubescent. Flowers crowded. Pedicel ca. 1 mm; basal bracteole 1, caducous, subulate, ca. 2.5 mm, apex long acuminate. Sepals 5, caducous, unequal; outer sepals 3, small, upper one boat-shaped, ca. 3.5 mm, on midvein winged on back, lateral ones elliptic, ca. 2.5 mm; inner sepals 2, petaloid, obovate or orbicular, ca. 7 × 5 mm, base unguiculate, apex rounded. Petals 3, connate in lower 1/2, pink to purplish, nearly equal, ca. 7 mm, apex with appendages 4-lamellate, yellow, and lobed. Stamens 8; filaments ca. 6 mm, lower 3/4 united, forming an open staminal sheath, and adnate with petals; anthers ovoid. Ovary ellipsoidal, ca. 2 mm, narrowly winged; style from base toward apex gradually thickened, curved, apex slightly lobed; stigma on lower lobe. Capsule orbicular or subsquare, ca. 5 mm in diam., winged, apex retuse and mucronate. Seeds black, ovoid, ca. 2 mm, ca. 1.2 mm in diam., white pubescent; strophiole white translucent, wing-shaped, ca. 2/3 as long as seeds. Fl. Mar–Apr, fr. Apr–May.

Damp rocks in forests on slopes, dry rocks on mountain ridges; 1200–2100 m. Guangxi, Yunnan [Vietnam].

19. *Polygala tatarinowii* Regel, Pl. Radd. 1: 278. 1861.

小扁豆 xiao bian dou

Salomonium martini H. Léveillé; *Semeiocardium hamiltonii* Hasskarl.

Herbs annual, erect, 5–15 cm tall. Stems simple or much branched, longitudinally angular, glabrous. Petiole 5–10 mm, narrowly winged; leaf blade green, ovate or elliptic to broadly elliptic, 8–25 × 6–15 mm, papery, sparsely pubescent, pinniveined, base cuneate, decurrent, margin entire, ciliate, apex acute. Racemes terminal, after anthesis to 6 cm; bracteoles 2, caducous, lanceolate, ca. 1 mm. Sepals 5, caducous after anthesis, green; outer sepals 3, ovate or elliptic, small, ca. 1 mm; inner sepals 2, petaloid, narrowly obovate, ca. 2 mm, apex retuse-rounded. Petals 3, connate in lower 2/3, red to purple-red; keel slightly shorter than lateral petals, tuberculate, apex rounded, without appendage. Stamens 8; filaments lower 3/4 united, forming an open staminal sheath; anthers ovoid. Ovary globose, ca. 0.5 mm in diam.; style curved, ca. 2 mm, apex funnelform, with oblique lobes; stigma on lower lobe. Capsule compressed-orbicular, ca. 2 mm in diam., sparsely pubescent, narrowly winged, apex mucronate. Seeds black, suboblong, ca. 1.5 mm, ca. 1 mm in diam., white pubescent; strophiole cucullate, small. Fl. Aug–Sep, fr. Sep–Nov.

Grasslands on slopes, thickets, roadsides; (500–)1300–3000 (–3900) m. Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan, Zhejiang [Bhutan, India, Japan, Kashmir, N Myanmar, Philippines; Malesia].

20. *Polygala bawanglingensis* F. W. Xing & Z. X. Li, Acta Bot. Austro Sin. 6: 54. 1990.

坝王远志 ba wang yuan zhi

Subshrubs, erect, 20–50 cm tall. Stems branched or not, reddish brown, ± fleshy. Petiole 1–2 cm; leaf blade green, obovate or elliptic, 1–8 × 0.3–3 cm, papery, both surfaces glabrous, midvein raised abaxially, impressed adaxially, lateral veins 6–10 pairs, raised abaxially, curved, anastomosing near margin, base cuneate, margin entire, apex obtuse, mucronate. Racemes terminal, axillary, or extra-axillary, ca. 5 cm, glabrous. Pedicel ca. 1.5 mm; bracteoles 3. Sepals 5, caducous; outer sepals 3, obovate to elliptic, small, apex rounded; inner sepals 2, petaloid, greenish yellow, broadly elliptic to suborbicular, large, 3–4 × 2–3 mm, 5-veined, apex rounded. Petals 3, connate in lower 1/2, yellow, ca. 3.5 mm; lateral petals elliptic; keel bright yellow, apex undulate, with boatlike appendages. Stamens 8; filaments lower 1/4 united, forming an open staminal sheath. Ovary obovoid, ca. 1 mm; style curved, apex funnelform. Capsule obcordate, ca. 4 mm in diam., winged, apex incised. Seeds 2, black, ellipsoidal, ca. 1 mm, densely white pilose, with strophiole and appendage. Fl. and fr. May–Jun.

• NE-facing karst limestone rock faces; 900–1000 m. Hainan (Changjiang).

21. *Polygala umbonata* Craib, Bull. Misc. Inform. Kew 1916: 260. 1916.

凹籽远志 ao zi yuan zhi

Herbs annual, erect, (10–)15–20 cm tall. Stems terete, longitudinally angular, glabrous, branching apically; branchlets spreading, slender. Petiole ca. 1 cm; leaf blade abaxially glaucescent, adaxially green, ovate or elliptic to elliptic-lanceolate, 3–4 × 1.5–2 cm, papery, abaxially glabrous, adaxially sparsely white setose or along margin densely minutely setose, midvein raised abaxially, impressed adaxially, lateral veins 5 or 6 pairs, anastomosing near margin, base cuneate, decurrent, apex acuminate. Racemes terminal or axillary, 1–4 cm. Pedicel 0.5–1 mm, slender; bracts 3, caducous, subulate, unequal. Sepals 5, caducous; outer sepals 3, ovate, ca. 1.5 mm; inner sepals 2, petaloid, elliptic, 3–3.5 mm, base unguiculate, apex rounded. Petals 3, connate in lower 1/2, yellow; lateral petals rectangular-oblong, longer than keel; keel with apex broadly retuse, with appendage of 2 lobes each with 2 points. Stamens 8; filaments lower 2/3 united, forming an open staminal sheath; anthers ovoid. Ovary ellipsoidal, ca. 1 mm, ca. 0.5 mm in diam.; style broadening from base toward apex but then narrowing at apex, curved, apex obliquely funnelform. Capsule suborbicular, ca. 3 mm in diam., winged. Seeds black, elliptic, ca. 1.2 mm, ca. 1 mm in diam., tuberculate, sparsely white pilose, strophiole 2-lobed, decurrent, other end of seed with oblong slightly curved shiny black appendage ca. 2/3 as long as seed. Fl. and fr. Oct–Nov.

Forests, moist lands in valleys; ca. 1200 m. S Yunnan (Menghai) [Myanmar, Thailand].

22. *Polygala furcata* Royle, Ill. Bot. Himal. Mts. 76. 1834.

肾果小扁豆 shen guo xiao bian dou

Polygala glaucescens Wallich ex Royle; *Salomonium seguinii* H. Léveillé.

Herbs annual, 5–15 cm tall. Stems longitudinally angular and narrowly winged, branching apically. Petiole ca. 0.5 cm; leaf blade abaxially glaucescent, adaxially green, ovate, elliptic, or ovate-lanceolate, 1.5–3 × 1–1.5 cm, papery, abaxially glabrous, adaxially white setose near margin, midvein raised abaxially, slightly impressed adaxially, lateral veins 4–6 pairs, anastomosing near margin, base broadly cuneate to rounded, margin entire, ciliate, apex acuminate. Racemes axillary, 1–3 cm, shorter than clumps of leaves, densely many flowered; bracts 3, caducous, ovate. Sepals 5, unequal, only an outer sepal persistent, others caducous after anthesis; outer sepals 3, elliptic-ovate, ca. 1.5 × 1 mm, apex obtuse; inner sepals 2, petaloid, obovate, ca. 2.5 × 1.5 mm, 3-veined, base unguiculate, apex rounded. Petals 3, connate in lower 1/2, yellow; lateral petals rectangular, ca. 2.5 mm, apex retuse; keel longer than lateral petals, apex with 2 flabelliform crested appendages. Stamens 8; filaments ca. 2 mm, lower 2/3 united, forming an open staminal sheath; anthers ovoid. Ovary globose, ca. 0.75 mm in diam.; style gradually broadening from base toward apex, apex slightly curved, pincerlike; stigma on lower lobes. Capsule suborbicular, shorter than wide, ca. 2.5 mm wide, base with a persistent outer sepal, winged, apex retuse, not mucronate, wing gradually broadened from base toward apex. Seeds black, ovoid, ca. 1 mm in diam., white pubescent; strophiole decurrent, slightly lobed. Fl. and fr. Aug–Sep.

Forests, sides of rocks, grasslands at roadsides; 1300–1600 m. Guangxi, Guizhou, Yunnan [Bhutan, N India, Myanmar, Nepal].

23. *Polygala lacei* Craib, Bull. Misc. Inform. Kew 1916: 260. 1916.

思茅远志 *si mao yuan zhi*

Herbs annual, erect, 10–24 cm tall. Stem and branches glabrous, longitudinally angular; branches stout. Petiole 5–10 mm; leaf blade abaxially greenish, adaxially green, ovate, 2–4(–5) × 1–2.5 cm, papery, abaxially glabrous, adaxially sparsely white hispidulous, midvein raised on both surfaces, lateral veins evident, anastomosing near margin, base cuneate, decurrent, margin ciliate, apex acuminate, bony mucronate. Racemes axillary, ca. 2 cm, to 6–12 cm at fruiting; peduncles longitudinally angular; bracteoles caducous. Sepals 5; outer sepals 3, ovate or deltoid-ovate, ca. 1.5 × 1 mm; inner sepals 2, petaloid, oblong, ca. 3 × 2 mm, base unguiculate, apex rounded. Petals 3, connate in lower 3/4, yellow; lateral petals longer than keel, oblong; keel 2-lamellate, apex lobed or not, with crested appendages. Stamens 8; filaments lower 3/4 united into an open sheath; anthers ovoid. Ovary obovoid, ca. 1 mm in diam.; style from base toward apex gradually broadened, curved, funnel-form; stigma in lower margin of funnel. Capsule globose or subsquare, ca. 3 mm in diam., winged, apex truncate or retuse, mucronate, wing gradually broadened from base to apex and with transverse veins. Seeds ellipsoidal, ca. 1.5 mm, ca. 1 mm in diam., tuberculate, glabrous, strophiole discoid, other end of seed with a small black shiny appendage. Fl. and fr. Sep–Oct.

Shrub forests on rocky hills; 1000–1700 m. S Yunnan [Myanmar, Thailand].

A similar species *Polygala cardiocarpa* has been mistakenly confused with this one, but it does not occur in China.

24. *Polygala carnosicaulis* W. H. Chen & Y. M. Shui, Acta Bot. Yunnan. 24: 428. 2002.

肉茎远志 *rou jing yuan zhi*

Herbs annual, 10–30 cm tall. Roots fibrous. Stems red, 4–6 mm in diam., fleshy, glabrous, branched. Petiole red, 0.8–1.8 cm; leaf blade abaxially greenish, adaxially green, ovate, 2.3–5.5 × 1.1–2.3 cm, papery, midvein raised abaxially, impressed adaxially, lateral veins 5 or 6 pairs, raised abaxially, anastomosing near margin, base cuneate, margin entire, apex acuminate. Racemes terminal, 2–2.6 cm, to 7–13 cm at fruiting. Pedicel 1.2–1.5 cm, angular, glabrous; bracts caducous, ovate, ca. 0.9 × 0.3 mm. Flowers yellow, small. Sepals 5, unequal, broadly ovate; outer sepals 3, ca. 1.2 × 1.1 mm; inner sepals 2, petaloid, ca. 3.5 × 2.5 mm, base unguiculate, apex obtuse. Petals 3, connate in lower 1/2, yellow; lateral petals oblong, 2–2.2 × 1.1–1.3 mm, apex slightly obtuse; keel 2.3–2.5 × 1.4–1.5 mm, near apex with 2 red orbicular entire appendages. Stamens 8; filaments ca. 3.5 mm, lower 2/3 united, forming an open staminal sheath; anthers yellow, ovoid, ca. 0.3 mm. Ovary obovoid, ca. 1 mm in diam.; style trumpet-shaped, gradually broadened from base toward apex, apex slightly curved, pincerlike; stigma on lower lobes. Capsules subglobose, 3.5–4 mm in diam., winged, apex retuse or obtuse, wing 0.5–0.8 mm. Seeds black, shiny, ellipsoidal, 1.2–1.4 mm, 0.8–0.9 mm in diam., punctate, base setiferous, with 2-lobed strophiole. Fl. Aug–Sep, fr. Sep–Oct.

• Shrub forests on rocky hills; 2000–2100 m. SE Yunnan (Hekou).

One of us (Parnell) prefers to treat this as a variety of *Polygala isocarpa*, differing in its punctate seeds and fleshy stems; however, two of us (Chen and Ma) recognize it as a good species because of its distinct stem and larger seeds.

25. *Polygala isocarpa* Chodat, Bot. Jahrb. Syst. 52(Beibl. 115): 77. 1914.

心果小扁豆 *xin guo xiao bian dou*

Herbs annual, erect, 5–14 cm tall. Stems terete, ridged, glabrous; branches corymbose. Petiole ca. 5 mm, winged; leaf blade green, ovate or ovate-triangular, 1.5–2.5 × 0.6–1 cm, papery, both surfaces glabrous, or only abaxially sparsely setose, margin ciliate, midvein and lateral veins evident, base cuneate, decurrent, margin entire, apex acuminate. Racemes terminal, ca. 7 cm after anthesis; bracts and bracteoles caducous, ovate, shorter than flowers, apex acute. Sepals 5; outer sepals 3, one persistent after anthesis, broadly ovate, ca. 1 mm, apex acuminate; inner sepals 2, oblong or ovate, ca. 2 × 1.5 mm, 3-veined, base unguiculate, apex rounded. Petals 3, connate in lower 2/3, yellow; lateral petals obliquely oblong, ca. 2 mm, apex truncate, oblique, obtuse; keel shorter than lateral petals, cucullate, apex with 2-lamellate, obtriangular appendages, glabrous. Stamens 8; filaments ca. 1.5 mm, lower 2/3 united, forming an open staminal sheath, not ciliate; anthers basifixed. Ovary obovoid or subglobose, ca. 1 mm in diam.; style gradually broadening from base toward apex, curved, apex funnel-form; stigma at lower margin. Capsule broadly obcordate or suborbicular, ca. 2 mm in diam., narrowly winged, wing with distinct transverse veins, adaxially flat, concave. Seeds black, shiny, ovoid, ca. 1 mm in diam., tuberculate, glabrous; strophiole white, 2-lobed, decurrent. Fl. and fr. Sep–Oct.

• On rocks in forests, grasslands, roadsides; 1200–1400 m. Guizhou, Sichuan (Yanbian), SE Yunnan.

26. *Polygala hybrida* Candolle, Prodr. 1: 325. 1824.

新疆远志 *xin jiang yuan zhi*

Polygala comosa Schkuhr var. *altaica* Chodat; *P. comosa* var. *hybrida* (Candolle) D. A. Petelin.

Herbs perennial, 15–40 cm tall. Stems caespitose, very shortly curved puberulent. Leaves sessile; leaf blade green, elliptic or lanceolate, 1.5–4.5 × 2–4 cm, thinly papery or membranous, midvein raised abaxially, impressed adaxially, lateral veins indistinct, base attenuate, margin entire, apex obtuse. Racemes terminal. Flowers dense. Pedicel ca. 2 mm, glabrous; bracteoles 3, caducous, subulate-deltoid, unequal in size, 3–5 mm, membranous, apex acuminate, ciliate. Sepals 5, persistent, membranous; outer sepals 3, elliptic-lanceolate, ca. 4 × 1.5 mm, apex obtuse, ciliate; inner sepals 2, petaloid, elliptic, large, ca. 8 × 4.5 mm, 5-veined, base unguiculate, apex obtuse or rounded. Petals 3, connate in lower 1/2, purple-red; lateral petals narrowly elliptic, oblique, ca. 7 mm, apex slightly sharp-pointed; keel shorter than lateral petals, ca. 4.5 mm, apex with slightly lobed appendages. Stamens 8; filaments ca. 4.5 mm, united throughout their length, forming an open staminal sheath, pubescent; anthers sessile, ovoid. Ovary narrowly ellipsoidal, ca. 1.5 mm, ca. 1 mm in diam., narrowly winged, glabrous; style ca. 2.5 mm, gradually

broadening from base toward apex, apex like a Chinese writing brush (\pm spindlelike); stigma lateral, extending 1/2 way down length of style apex. Capsule oblong, ca. 6 mm, ca. 4 mm in diam., glabrous, winged. Seeds densely sericeous, strophiole. Fl. May–Jul, fr. Jun–Sep.

Forests on slopes of hills, grasslands, sand dunes; 1200–1800 m. Xinjiang [Mongolia, Russia].

27. *Polygala lhunzeensis* C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 86. 1980.

隆子远志 long zi yuan zhi

Herbs perennial, 15–20 cm tall. Stems simple or little branched, curved pubescent. Petiole short; leaf blade green, lanceolate to linear-lanceolate, 1–2 cm \times 2–4 mm, papery, both surfaces sparsely curved pubescent, midvein slightly raised abaxially, impressed adaxially, lateral veins absent, base cuneate, margin entire, apex acuminate, mucronate. Racemes extra-axillary, 3–4 cm, laxly 5–10-flowered; bracts 2, caducous. Pedicel ca. 3 mm. Sepals 5, persistent, ciliate; outer sepals 3, nearly equal, lanceolate; inner sepals 2, oblong, large, ca. 5.5 \times 2 mm, 3-veined, veins multibranched, margin membranous, hyaline, apex subrounded, mucronate. Petals 3, connate at base, pink; lateral petals elliptic, 3–3.5 mm, inside white pubescent at base; keel cucullate, longer than lateral petals, 4.5–5 mm, abaxially pubescent, apex with fimbriate appendages. Stamens 8; filaments ca. 5 mm, united into an open staminal sheath, upper 1/5 of sheath 2-lobed; anthers sessile. Ovary obovoid, ca. 1 mm in diam.; style ca. 2.5 mm, apex curved; stigmas 2. Capsule obcordate to suborbicular, ca. 4 mm in diam., margin narrowly winged, ciliate, apex retuse, mucronate. Seeds ovoid, ca. 1.5 mm in diam., white pubescent, with 3-lobed orbicular appendages. Fl. and fr. Jun–Jul.

• Grasslands on slopes of hills; ca. 2700 m. SE Xizang (Lhünzê).

28. *Polygala wexianensis* Y. S. Zhou & Z. X. Peng, Bull. Bot. Res., Harbin 12: 363. 1992.

文县远志 wen xian yuan zhi

Herbs perennial, 6–15 cm tall. Stems caespitose, curved pubescent. Petiole short, ca. 1 mm; leaf blade abaxially purple-red, adaxially dark green, ovate, broadly ovate, or orbicular, 0.3–1.5 \times 0.4–1.5 cm, thickly papery, both surfaces curved pubescent, midvein raised abaxially, slightly impressed adaxially, lateral veins indistinct on both surfaces, base rounded, margin entire, recurved, apex obtuse, mucronate. Racemes opposite to leaves or extra-axillary, often with a solitary flower at base of racemes, or sometimes only a solitary flower; inflorescence 0.5–2 cm, 2–4-flowered; peduncle 2–3 mm. Pedicel 1–3 mm, curved pubescent. Flowers 3–5 mm. Sepals 5, persistent, purple-red; outer sepals 3, ovate, small, ca. 3 mm, abaxially curved pubescent, adaxially glabrous; inner sepals 2, large, obliquely obovate, ca. 6 \times 2.5 mm, curved pubescent on midvein and margin. Petals 3, connate in lower 1/2, purple-red; lateral petals oblong-elliptic, ca. 5 \times 1.5 mm, inside pubescent at base; keel shorter than lateral petals, ca. 4 mm, apex with fimbriate crested appendages. Stamens 7 or 8; filaments ca. 4 mm, lower 2/3 forming a staminal sheath, ciliate, adnate with petals, upper 1/3 2-lobed or connate throughout. Ovary obovoid, winged, ciliate;

style ca. 2 mm, slightly curved. Capsule obcordate, ca. 5 mm in diam., broadly winged, apex retuse, wing ca. 0.5 mm wide, ciliate. Seeds black, ovoid, ca. 1.5 mm in diam., densely white villous; strophiole yellowish, membranous, white pubescent, 3-parted, ca. 1/2 as long as seeds. Fl. and fr. Jun–Aug.

• Grasslands on slopes of hills; ca. 900 m. S Gansu (Wenxian).

29. *Polygala japonica* Houttuyn, Handl. Pl.-Kruidk. 10: 89. 1779.

瓜子金 gua zi jin

Polygala japonica var. *angustifolia* Koidzumi; *P. japonica* f. *ovatifolia* Chodat; *P. luzoniensis* Merrill; *P. sibirica* Linnaeus var. *japonica* (Houttuyn) Ito; *P. taquetii* H. Léveillé.

Herbs perennial, 15–20 cm tall. Stems and branches erect or decumbent, brown-green or green, longitudinally angular, curved pubescent. Petiole ca. 1 mm, pubescent; leaf blade ovate or ovate-lanceolate, rarely linear-lanceolate, 1–2.3(–3) cm \times (3–)5–9 mm, thickly papery or subleathery, both surfaces glabrous or pubescent, midvein raised abaxially, impressed adaxially, lateral veins 3–5 pairs, raised on both surfaces, pubescent, base broadly cuneate to rounded, margin entire, apex obtuse, mucronate. Racemes opposite to leaves, or extra-axillary, uppermost raceme lower than apices of stems. Pedicel ca. 7 mm, thin, pubescent; bracteoles caducous, basal, lanceolate. Sepals 5, persistent, ciliate; outer sepals 3, lanceolate, ca. 4 mm, abaxially pubescent; inner sepals 2, petaloid, ovate to oblong, ca. 6.5 \times 3 mm, base unguiculate, apex rounded, mucronate. Petals 3, connate at base, white to purple; lateral petals oblong, ca. 6 mm, inside pubescent at base; keel apex with cymbiform, fimbriate appendages. Stamens 8; filaments ca. 6 mm, united throughout, forming an open staminal sheath, ciliate; anthers sessile. Ovary obovoid, ca. 2 mm in diam., winged; style ca. 5 mm, curved; stigmas 2, separate, one apical, other one lateral and 0.5–1 mm lower down style. Capsule orbicular, ca. 6 mm in diam., shorter than inner sepals, margin broadly winged, not ciliate, apex retuse, with rostrum, wing with transverse veins. Seeds 2, black, ovoid, ca. 3 mm, ca. 1.5 mm in diam., densely white pubescent; strophiole unequal, 2-lobed, decurrent, sparsely pubescent. Fl. Apr–May, fr. May–Aug. $2n = 14^*$, 42.

Grassy areas on slopes of hills, field margins; 800–2100 m. Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan, Taiwan, Xinjiang, Yunnan, Zhejiang [NE India, Japan, Korea, Malaysia, Myanmar, New Guinea, Philippines, Russia (E Siberia), Sri Lanka, N Vietnam].

30. *Polygala polifolia* C. Presl, Reliq. Haenk. 2: 101. 1835.

小花远志 xiao hua yuan zhi

Polygala arvensis F. Adema (1966), not Willdenow (1802); *P. brachystachya* Candolle (1824), not Blume (1825), nor *P. brachistachyos* Poiret (1816); *P. chinensis* Linnaeus f. *arvensis* (Willdenow) Chodat; *P. kinii* Courtois; *P. shimadae* Masamune; *P. telephoides* A. W. Bennett (1872), not Willdenow (1802); *P. warburgii* Chodat.

Herbs annual, 10–15 cm tall. Main root woody. Stems multibranched, diffuse, densely curved pubescent. Petiole very short, pubescent; leaf blade green, obovate, oblong, or elliptic-

oblong, 5–12 × 2–5 mm, thickly papery, midvein slightly raised abaxially, slightly impressed adaxially, lateral veins nearly absent, base broadly cuneate to obtuse, margin entire, apex obtuse to acute, mucronate. Racemes axillary or extra-axillary; peduncles very short, shorter than leaves, few flowered and clusterlike, 2–10 mm; basal bracts 3, caducous, ovate, unequal, 0.5–1 mm, ciliate. Pedicel short, pubescent. Sepals 5, persistent; outer sepals 3, ovate, 1.2–3 × 1–1.2 mm, apex acuminate; inner sepals 2, obliquely oblong or elliptic, 3–3.5 × ca. 2 mm, base attenuate, apex acuminate. Petals 3, connate at base, white or purple; lateral petals triangular-rhombic, ca. 2.5 × 1 mm, margin sometimes undulate, emarginate, glabrous; keel cucullate, longer than lateral petals, apex with 2 indistinct groups of multifid appendages. Stamens 8; filaments ca. 2 mm, forming an open staminal sheath split in upper 1/2–2/3, with 2 separate single filaments with anthers in middle, and on either side of these a united group of 3 filaments each carrying 3 sessile anthers at tip. Ovary oblong, ca. 1 mm in diam.; style ca. 2 mm, gradually thickened toward apex, curved; stigma mammilliform. Capsule suborbicular, ca. 2 mm in diam., margin minutely winged, very sparsely pubescent. Seeds 2, black, oblong, ca. 1.5 mm, ca. 1 mm in diam., densely white pubescent; strophiole white, 3-lobed. Fl. and fr. Jul–Oct.

Beaches along seashores, grasslands on slopes of hills; near sea level to middle elevations. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Bangladesh, Cambodia, India, Indonesia, Laos, Malaysia, New Guinea, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

The nomenclature of this species is much confused. In summary, the name *Polygala chinensis* has been misapplied for many years to a number of species including this one. The treatment by van der Meijden (Fl. Males., Ser. 1, Spermat. 10: 455–539. 1988) should be referred to for further details.

31. *Polygala monopetala* Cambessèdes in Jacquemont, Voy. Inde 4(Bot.): 25. 1835–1844.

单瓣远志 dan ban yuan zhi

Polygala sibirica Linnaeus var. *monopetala* (Cambessèdes) Chodat.

Herbs perennial, 15–20 cm tall. Principal root curved, dark gray-brown, stout. Stems short, multibranched; branchlets slender, white and curved pubescent. Petiole very short, pubescent; leaf blade green, linear-lanceolate or elliptic-lanceolate, 1–1.8 × 0.3–0.4 mm, thickly papery, abaxially glabrous, adaxially curved pubescent, midvein raised abaxially, slightly impressed adaxially, lateral veins obscure, base attenuate, margin entire, recurved, apex acuminate, mucronate. Racemes axillary or terminal, ca. 1.5 cm, pubescent, few flowered; basal bracts 3, lanceolate, unequal, shorter than pedicels. Sepals 5, persistent, ciliate; outer sepals 3, lanceolate, nearly equal, ca. 2 mm, abaxially pubescent; inner sepals 2, elliptic-oblong, ca. 4 × 2 mm, midvein green, margin nearly pellucid, apex acute. Petals 2, connate near base, purplish; lateral petal 1, elliptic, ca. 3.5 mm, inside pubescent at base; keel cucullate, ca. 4 mm, base cuneate, apex with 2 indistinct groups of small appendages. Stamens 6–8; filaments ca. 4 mm, forming an open staminal sheath split in upper 1/4 with 2 separate single filaments with anthers in middle, and on either side of these a united group of 2 or 3 filaments each carrying 2 or 3 sessile anthers at tip. Ovary orbiculate-

globose, ca. 1 mm in diam.; style curved, 2–2.5 mm; stigmas 2. Capsule orbicular, margin narrowly winged, ciliate, apex truncate and retuse, mucronate. Seeds black, ovoid, white pubescent, with 3-lobed strophiole, lateral lobes longer. Fl. Jul–Aug, fr. Sep–Oct.

Forest margins on slopes of hills, grasslands; 3000–3800 m. Qinghai, SE Xizang [Kashmir].

32. *Polygala tenuifolia* Willdenow, Sp. Pl. 3(2): 879. 1802.

远志 yuan zhi

Polygala sibirica Linnaeus var. *angustifolia* Ledebour; *P. sibirica* var. *tenuifolia* (Willdenow) Backer & Moore.

Herbs perennial, 15–50 cm tall. Principal root to 10 cm, stout, base fleshy. Stems much branched, caespitose, erect or inclined, ridged and sulcate, pubescent. Leaves subsessile; leaf blade linear to linear-lanceolate, 10–30 × 0.5–1(–3) mm, papery, glabrous or very sparsely puberulent, midvein raised abaxially, impressed adaxially, lateral veins obscure, base cuneate, margin entire, recurved, apex acuminate. Racemes terminal, secund, 5–7 cm, slender, becoming slightly pendulous, sparsely few flowered; bracts 3, caducous, lanceolate, ca. 1 mm, apex acuminate. Sepals 5, persistent, glabrous; outer sepals 3, linear-lanceolate, ca. 2.5 mm, apex acute; inner sepals 2, petaloid, obovate or elliptic, ca. 5 × 2.5 mm, midvein green, base unguiculate, margin membranous, violet, apex rounded, mucronate. Petals 3, connate in lower 1/3, purple; lateral petals obliquely oblong, ca. 4 mm, inside hairy at base; keel longer than lateral petals, apex with fimbriate appendages. Stamens 8; filaments forming an open staminal ciliate sheath split in upper 1/4 with 2 separate single filaments with anthers in middle, and on either side of these a united group of 3 filaments each carrying 3 sessile oblong anthers at tip. Ovary compressed-orbicular, apex retuse; style curved, apex trumpet-shaped; stigma in trumpet. Capsule orbicular, ca. 4 mm in diam., narrowly winged, eciliate, apex retuse. Seeds black, ovoid, ca. 2 mm in diam., densely white pubescent, with 2-lobed decurrent strophiole. Fl. and fr. May–Sep. $2n = 32$, 34.

Prairies, grasslands, shrub forests, thickets on mountain slopes; (200–)500–2300 m. Gansu, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan [Korea, Mongolia, Russia].

33. *Polygala crotalarioides* Buchanan-Hamilton ex Candolle, Prodr. 1: 327. 1824.

西南远志 xi nan yuan zhi

Herbs perennial, 6–20 cm tall, erect or diffuse, shortly curved pubescent with, at least, some hirsute-cottony hairs. Primary root deep brown, stout. Stems woody at base, multibranched, usually erect. Leaves alternate; petiole ca. 2 mm; leaf blade green, elliptic or obovate-elliptic, 1.5–4(–7.5) × 0.7–2.5(–4) cm, papery, midvein raised abaxially, slightly impressed adaxially, lateral veins 3–5 pairs, anastomosing near margin, reticulate veins obscure, base obtuse or subrounded, margin entire, ciliate, apex obtuse or retuse. Racemes axillary or opposite to leaves, 1.2–2 cm, 8–15-flowered. Pedicel ca. 2 mm; basal bracts 3, persistent, ovate, ca. 2 mm, apex long acuminate, ciliate. Flowers 6–9 mm. Sepals 5, persistent, ciliate;

outer sepals 3, unequal, upper one broadly elliptic or suborbicular, ca. 3×2.5 mm, apex rounded, both lateral ones elliptic-ovate, smaller; inner sepals 2, petaloid, obliquely ovate, $6-7 \times$ ca. 4 mm, base unguiculate, apex obtuse, thinly mucronate. Petals 3, free, purple-red or white and purple striate; lateral petals 4–5 mm, inside pilose at base, inside fasciculate white villous at middle, apex rounded, retuse, ciliate; keel longer than lateral petals, 5–7 mm, ciliate, apex with fimbriate appendages. Stamens 8; filaments 5–6 mm, forming an open staminal ciliate sheath, adnate with petals, ciliate; anthers yellow, ovoid. Ovary subglobose, ca. 2 mm in diam., winged, ciliate, especially densely so apically; style curved; stigmas 2. Capsule orbicular, ca. 3.5 mm in diam., narrowly winged, ciliate, apex retuse. Seeds 2, black, oblong, ca. 2.5 mm, ca. 1.5 mm in diam., densely white villous; strophiole cucullate, slightly 3-lobed. Fl. and fr. Jul–Sep.

Shrub forests on slopes of hills, grasslands; 1100–2300 m. SW Sichuan, S Xizang, N Yunnan [India, Kashmir, Laos, Myanmar, Nepal, Thailand].

34. *Polygala subopposita* S. K. Chen, Acta Bot. Yunnan. 2: 85. 1980.

合叶草 he ye cao

Herbs annual, erect, 10–40 cm tall. Primary roots orange, stout. Stems and branches terete, white flattened-villous. Leaves subopposite, sessile; leaf blade green, broadly elliptic or oblong-elliptic, $1.5-3 \times 1-2$ cm, papery, both surfaces villous, midvein slightly raised abaxially, slightly impressed adaxially, lateral veins 3 or 4 pairs, slightly raised and indistinct abaxially, veinlets absent, base rounded to cordate, margin entire, ciliate, apex obtuse, mucronate. Racemes supra-axillary; peduncles 5–10 mm, villous; bracts 3, caducous, sometimes persistent, subulate, ciliate. Sepals 5, persistent, ciliate; outer sepals 3, ovate, unequal, 2–3 mm, outside villous, apex acuminate; inner sepals 2, falcate, obliquely ovate, ca. 5×2 mm, green, 5-veined, base unguiculate, apex acuminate-acute. Petals 3, connate at base, white or yellow; lateral petals oblong, ca. 4×2 mm, inside fasciculate white villous at middle; keel cucullate, ca. 5 mm, apex with stalked, fimbriate appendages. Stamens 8; filaments ca. 4 mm, lower 1/2 forming a staminal sheath split at top, adnate with petals; anthers ellipsoidal, stalked. Ovary obovoid, ca. 1.3 mm in diam., narrowly winged, ciliate; style slightly arcuate, apex hooklike; stigma in hook. Capsule green when mature, suborbicular, wider than long, ca. 4 mm in diam., winged, ciliate, apex incised, white villous. Seeds 2, black, ellipsoidal-ovoid, compressed, ca. 3 mm, ca. 1.5 mm in diam., white villous; strophiole 2-lobed, other end with brown small tubercle. Fl. and fr. Aug–Nov.

• Shrub forests, grasslands on slopes or in valleys; 600–1400 m. SW Guizhou (Anlong, Zhenfeng), Sichuan, S Yunnan (Xishuangbanna).

35. *Polygala paniculata* Linnaeus, Syst. Nat., ed. 10, 2: 1154. 1759.

圆锥花远志 yuan zhui hua yuan zhi

Herbs annual, erect, 10–50 cm tall. Stems terete, mostly much branched, glandular pubescent. Leaves alternate, sessile, lowest 4 or 5 often in pseudowhorls; leaf blade lanceolate to linear-lanceolate, $5-20 \times 1-4$ mm, 1-veined, lateral veins absent,

base attenuate, margin entire, apex acute. Racemes terminal or opposite to leaves, 2–15 cm. Pedicel 0.5–1 mm; basal bracteoles caducous, lanceolate, apex acute. Sepals 5; outer sepals 3, \pm elliptic, apex obtuse; inner sepals 2, purple, petaloid, elliptic-oblong, ca. 2 mm, 3-veined. Petals 3, white or violet; lateral petals narrowly ovate-lanceolate, attenuate to apex; keel apex with multifid appendages. Stamens 8, forming an open staminal sheath glabrous inside and split at top into 8 very short free filaments. Ovary obovoid to nearly globose; style straight, 1.5–2 \times as long as ovary, apex expanded into an oblique broad cup, upper portion of which ends in tuft of hair; stigma at base of cup. Capsule oblong, ca. 2 mm, not winged, apex notched, glabrous. Seeds black, oblong, densely white pubescent; strophiole small, with 2 membranous appendages.

Low elevations. Guangdong, Taiwan (introduced and naturalized) [widely distributed in the tropics].

36. *Polygala triflora* Linnaeus, Sp. Pl. 2: 705. 1753.

金花远志 jin hua yuan zhi

Polygala aurata Gagnepain; *P. aurata* var. *macrostachya* Gagnepain.

Herbs perennial, prostrate, 5–40 cm tall. Stems multi-branched, erect, procumbent, or ascending, appressed pubescent. Petiole ca. 1 mm; leaf blade linear or linear-lanceolate, $10-20(-27) \times 2.5-3$ mm, membranous, 1-veined, both surfaces glabrous or sparsely hairy, base attenuate, margin entire, apex shortly acute. Racemes opposite to leaves or supra-axillary, 1–3 cm, rather few flowered; rachis filiform, 1–3 cm. Pedicel ca. 1.5 mm; basal bracteoles 2, caducous, lanceolate. Flowers 3.5–4.5 mm. Sepals 5, persistent, green, ciliate; outer sepals 3, ovate-lanceolate, ca. 2 mm, apex acuminate; inner sepals 2, obovate to falcate, ca. 3 mm, apex acute, aristate, ciliate. Petals 3, connate at base, yellow; lateral petals broadly obovate, ca. 2 mm; keel cucullate, nearly as long as or slightly shorter than lateral petals, apex with 2 fascicled appendages, each fascicle deeply lobed at apex. Stamens 8, lower 2/3 united, forming an open staminal ciliate sheath and split in upper 1/3 into 8 free filaments; anthers ovoid. Ovary obovoid, ca. 1 mm, winged, ciliate; style curved, apex hooklike; stigma in hook. Capsule obovoid-ellipsoidal, ca. 3 mm, ca. 2.5 mm in diam., narrowly winged, ciliate, apex notched. Seeds black, ovoid, ca. 3 mm, white pubescent; strophiole \pm cucullate, 3-lobed, lobes membranous. Fl. and fr. unknown.

Grasslands in open country. Hainan (Baoting, Lingshui, Wanning) [Cambodia, N India, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand; Australia].

Polygala brachystachya Blume (1825, not Candolle, 1824, nor *P. brachistachyos* Poiret, 1816; *P. chinensis* Linnaeus var. *brachystachya* Bennett) and *P. linarifolia* Willdenow (*P. chinensis* var. *linarifolia* (Willdenow) Chodat) are synonyms of *P. glaucoides* Linnaeus, which can be easily and reliably separated from *P. triflora* only on the basis of the marginal hairs on the capsule: in *P. triflora* they are stiff and erect (clearly ciliate), whereas in *P. glaucoides* they are short and curved/crisped.

37. *Polygala chinensis* Linnaeus, Sp. Pl. 2: 704. 1753.

华南远志 hua nan yuan zhi

Herbs annual, erect, 10–25 cm tall. Primary roots orange,

stout. Stems woody at base; branches terete, crisped pubescent. Petiole ca. 1 mm, pubescent; leaf blade green, obovate, elliptic, or lanceolate, 2.6–10 × 1–1.5 cm, papery, pubescent, midvein raised abaxially, impressed adaxially, lateral veins few, obscure, base cuneate to rounded or cordate, margin entire, slightly recurved, apex obtuse, mucronate, or acuminate. Racemes superaxillary, rarely axillary, shorter than leaves, only ca. 1 cm, densely few flowered. Pedicel ca. 1.5 mm; basal bracts 2, caducous, lanceolate. Flowers ca. 4.5 mm. Sepals 5, persistent, green, ciliate; outer sepals 3, ovate-lanceolate, ca. 2 mm, apex acuminate; inner sepals 2, petaloid, falcate, ca. 4.5 mm, conspicuously 4- or 5-veined, base unguiculate, apex acuminate. Petals 3, connate at base, yellowish or white with pink; lateral petals shorter than keel, inside with fascicled white hairs at base; keel ca. 4 mm, apex with 2 fascicled appendages. Stamens 8, lower 1/2 united forming an open staminal sheath, split in upper 1/2 into 8 free filaments; anthers narrowly ovoid. Ovary compressed-orbicular, ca. 1 mm in diam., ciliate; style curved, apex hooklike; stigma in hook. Capsule globose, ca. 2 mm in diam., narrowly winged, ciliate, apex retuse. Seeds black, ovoid, densely white pubescent; strophiole white, cucullate, 2-lobed. Fl. Apr–Oct, fr. May–Nov.

Grasslands, shrub forests on slopes of hills; 500–1100 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Laos, Malaysia, New Guinea, Philippines, Thailand, Vietnam].

Three somewhat indistinct varieties are recognized in China. However, given the wide range of variation in this species seen outside of China, their status warrants re-examination.

- 1a. Stem, branches, and leaves densely villous 37c. var. *villosa*
 1b. Stem and branches crisped pubescent.
 2a. Plant more than 10 cm tall; leaf blade obovate, elliptic, or lanceolate 37a. var. *chinensis*
 2b. Plant dwarf, less than 10 cm tall; leaf blade ± linear 37b. var. *pygmaea*

37a. *Polygala chinensis* var. *chinensis*

华南远志(原变种) hua nan yuan zhi (yuan bian zhong)

Polygala densiflora Blume; *P. glomerata* Loureiro; *P. telephioides* Willdenow.

Herbs erect, 10–25 cm tall. Stems, branches, and leaves crisped pubescent. Leaf blade obovate, elliptic, or lanceolate, 2.6–10 × 1–1.5 cm. Fl. Apr–Oct, fr. May–Nov.

Grasslands, shrub forests on slopes of hills; 500–1000 m. Fujian, Guangdong, Guangxi, Hainan, Yunnan [India, Philippines, Vietnam].

37b. *Polygala chinensis* var. *pygmaea* (C. Y. Wu & S. K. Chen) S. K. Chen & J. Parnell, **comb. nov.**

矮华南远志 ai hua nan yuan zhi

Basionym: *Polygala glomerata* Loureiro var. *pygmaea* C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 89. 1980.

Herbs annual, dwarf, less than 10 cm tall. Stems and branches crowded, crisped pubescent. Leaf blade ± linear.

- Grasslands on slopes of hills; ca. 1100 m. Yunnan (Eshan).

37c. *Polygala chinensis* var. *villosa* (C. Y. Wu & S. K. Chen) S. K. Chen & J. Parnell, **comb. nov.**

长毛华南远志 chang mao hua nan yuan zhi

Basionym: *Polygala glomerata* Loureiro var. *villosa* C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 90. 1980.

Herbs annual. Stems, branches, and leaves densely ex-panate villous. Leaf blade linear-lanceolate, 2–4 × 0.4–0.6 cm.

- Grasslands on slopes of hills; middle elevations. S Guangxi.

38. *Polygala longifolia* Poiret in Lamarck, Encycl. 5: 501. 1804.

长叶远志 chang ye yuan zhi

Polygala discolor Buchanan-Hamilton ex D. Don; *P. leptalea* Candolle; *P. oligophylla* Candolle; *P. pyramidalis* H. Léveillé.

Herbs annual, 20–47(–150) cm tall. Stems slender, winged or ridged, sparsely pubescent, little branched. Leaves subsessile; leaf blade papery; basal leaves dense, ovate, 5–10 × ca. 5 mm; upper leaves sparse, lanceolate to elliptic-lanceolate; subterminal leaves linear-lanceolate, 2–2.5 × 0.2–0.5 cm, green, glabrescent, midvein raised abaxially, impressed adaxially, lateral veins obscure, base cuneate, margin entire, slightly recurved, apex acuminate. Racemes terminal, ca. 5 cm, to 10(–20) cm after anthesis, glabrous or slightly pubescent, densely flowered; bracteoles 3, caducous, pubescent, median one triangular-subulate, ca. 2 mm, lateral ones ovate-lanceolate, ca. 1 mm. Sepals 5, persistent; outer sepals 3, median one keel-like, ca. 2 mm, lateral ones small; inner sepals 2, petaloid, obovate, ca. 3 × 2 mm, base unguiculate, apex rounded. Petals 3, connate in lower 1/3, pink or purplish; lateral petals shorter than keel, subrhomboid or ± obovate; keel apex with papilionaceous appendages. Stamens 8, lower 1/2–3/4 united forming an open staminal sheath, split in upper 1/4–1/2 into 8 free filaments; anthers yellow, ovoid. Ovary ovoid, ca. 0.5 mm in diam.; style curved, hooklike; stigma mammilliform. Capsule oblong, ca. 3 mm, ca. 2 mm in diam.; carpel with foveolate striation, margin unequally obliquely winged. Seeds black, oblong, white pubescent; strophiole white, membranous, pubescent, 3-lobed. Fl. and fr. Aug–Nov.

Forest margins, grasslands on slopes of hills; 1100–1400 m. Guangdong, Guangxi, Guizhou, Yunnan [Cambodia, India, Indonesia, Kashmir, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

39. *Polygala persicariifolia* Candolle, Prodr. 1: 326. 1824 [“*persicariaefolia*”].

蓼叶远志 liao ye yuan zhi

Polygala buchananii Buchanan-Hamilton ex D. Don, nom. illeg. superfl.; *P. septemnervia* Merrill; *P. wallichiana* Wight.

Herbs annual, 10–70 cm tall. Stems terete, mostly branched, crisped pubescent. Petiole short; leaf blade lanceolate to linear-lanceolate, 3–6.5 × 0.5–1.5 cm, thinly papery, both surfaces hispidulous or pubescent, midvein conspicuous, base cuneate, ciliate, apex obtuse. Racemes in fork and terminal on lateral branches, 2–9 cm. Pedicel 2.5–5 mm; bracts 3, persistent, unequal, lanceolate. Sepals 5, persistent, ciliate; outer sepals 3, unequal, median one boatlike, ca. 4 mm, narrowly winged on

midvein, lateral ones ovate-elliptic, ca. 3 mm; inner sepals 2, petaloid, broadly obovate or orbicular, ca. 6 mm in diam., 5-veined, anastomosing, base unguiculate. Petals 3, connate in lower 1/2, pink to purple; lateral petals \pm obliquely rhombic, inside hairy at base; keel cucullate, ciliate, apex with 2 bundles of linear appendages. Stamens 8, lower 1/2–3/4 united forming an open staminal sheath adnate with petals, split in upper 1/4–1/2 into 8 free filaments; anthers ovoid. Ovary obovoid, ciliate; style curved; stigmas 2, slightly spaced, one apical, other lateral, sessile. Capsule oblong or orbicular, ca. 5 mm, narrowly winged, ciliate. Seeds black, oblong, slightly compressed, ca. 4 mm, white villous; strophiole cucullate, shallowly 3-lobed. Fl. Jul–Sep, fr. Aug–Oct.

Forests, grasslands, roadsides on slopes of hills; 1200–2200 (–2800) m. Guangxi, Guizhou, Sichuan, Yunnan [Bhutan, Cambodia, Indonesia, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand; Africa].

40. *Polygala hongkongensis* Hemsley, J. Linn. Soc., Bot. 23: 60. 1886.

香港远志 xiang gang yuan zhi

Herbs or subshrubs, erect, 15–50 cm tall. Stem and branches thin, sparsely to densely crisped pubescent. Petiole ca. 2 mm, pubescent; leaf blade papery or membranous; lower leaves ovate, 1–2 \times 0.5–1.5 cm, apex mucronate; upper leaves lanceolate or ovate-lanceolate, 4–6 \times 2–2.2 cm, abaxially greenish or glaucous, adaxially green, both surfaces glabrous, midvein raised abaxially, slightly impressed adaxially, lateral veins 3 pairs, indistinct, base rounded, margin entire, \pm recurved, apex acuminate. Racemes terminal, 3–6 cm, rachis and pedicels pubescent, sparsely 7–18-flowered. Pedicel 1–2 mm; basal bracts 3, caducous, subulate. Flowers 7–9 mm. Sepals 5, persistent, ciliate; outer sepals 3, boat-shaped or elliptic, inwardly concave, ca. 4 mm, median one narrowly winged on midvein; inner sepals 2, petaloid, obliquely ovate and 5–8 \times 3–5 mm, or elliptic and ca. 7 \times 4 mm, base attenuate, apex mucronate. Petals 3, connate in lower 2/5, white or purple; lateral petals 3–5 mm, inside pubescent at base, margin undulate, apex rounded; keel cucullate, ca. 5 mm, apex with broad fimbriate appendages. Stamens 8; filaments ca. 5 mm, lower 2/3 united forming an open staminal sheath adnate in lower 1/2 with petals; anthers clavate. Ovary obovoid, ca. 1.5 mm, stalked, glabrous; style compressed, arcuate; stigmas 2, close together. Capsule sub-orbicular, ca. 4 mm in diam., base with persistent sepals, broadly winged, apex retuse. Seeds 2, black, ovoid, ca. 3.5 mm, ca. 1.5 mm in diam., thinly white pubescent; strophiole 3-lobed, 1/3–1/2 as long as seeds. Fl. May–Jun, fr. Jun–Jul, or fl. and fr. Mar–Apr.

• Forests, forest margins, grasslands, shrub forests, mountain valleys; 300–1400 m. Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hunan, Jiangsu, Jiangxi, Sichuan, Xinjiang, Zhejiang.

- 1a. Leaf blade lanceolate or ovate-lanceolate,
4–6 \times 2–2.2 cm 40a. var. *hongkongensis*
1b. Leaf blade linear or linear-lanceolate,
1.5–3 \times 0.3–0.4 cm 40b. var. *stenophylla*

40a. *Polygala hongkongensis* var. *hongkongensis*

香港远志(原变种) xiang gang yuan zhi (yuan bian zhong)

Polygala loureiroi Gardner & Champion, p.p.; *P. trichorachis* Migo.

Leaf blade lanceolate or ovate-lanceolate, 4–6 \times 2–2.2 cm. Inner sepals obliquely ovate, 5–8 \times 3–5 mm. Filaments free in upper 1/3. Fl. May–Jun, fr. Jun–Jul.

• Forests, shrub forests in mountain valleys; 500–1400 m. Fujian, Guangdong, Guangxi, Hunan, Jiangxi, Sichuan, Xinjiang.

40b. *Polygala hongkongensis* var. *stenophylla* Migo, Acta Phytotax. Geobot. 13: 86. 1943.

狭叶香港远志 xia ye xiang gang yuan zhi

Polygala stenophylla Hayata, Icon. Pl. Formos. 3: 33. 1913, not A. Gray (1856).

Leaf blade linear or linear-lanceolate, 1.5–3 \times 0.3–0.4 cm, adaxially sparsely pubescent. Inner sepals elliptic, ca. 7 \times 4 mm. Filaments free in upper 1/5. Seeds ca. 2.5 mm; strophiole 3-lobed, ca. 1/3 as long as seeds. Fl. and fr. Mar–Apr.

• Forests, forest margins, grasslands in mountain valleys; 300–1200 m. Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, Zhejiang.

41. *Polygala lijiangensis* C. Y. Wu & S. K. Chen, Acta Bot. Yunnan. 2: 88. 1980.

丽江远志 li jiang yuan zhi

Herbs perennial, 15–20 cm tall. Stem, branches, petioles, inflorescence, and pedicels crisped pubescent. Petiole short; leaf blade papery; lower leaves ovate, small; upper leaves ovate to ovate-lanceolate, large, 1.5–2 cm \times 5–7 mm, abaxially mostly glabrous but pubescent on midvein, adaxially sparsely puberulent, lateral veins indistinct, base obtuse, margin recurved, apex acuminate, mucronate. Racemes opposite to leaves, 1.5–2 cm, 3–8-flowered; bracteoles 3, caducous. Flowers ca. 6 mm. Sepals 5, persistent, ciliate; outer sepals 3, pubescent, upper one boatlike, ca. 4 mm; inner sepals 2, obovate, ca. 6 \times 3 mm, apex acuminate, subfalcate. Petals 3, connate in lower 1/2; lateral petals elliptic, 3.5–4 mm, inside pubescent at base, apex rounded, retuse; keel 4.5–5 mm, apex with 2 fascicles of linear 4-lobed appendages. Stamens 8; filaments ca. 4.5 mm, lower 2/3 united into an opening tube adnate with petals, tube upper 1/2 2-lobed, ciliate; anthers ovoid. Ovary globose, ca. 2 mm in diam., winged; style ca. 3 mm, apex curved; stigmas 2, spaced. Capsule orbicular, ca. 4 mm in diam., broadly winged and ciliate, apex retuse. Seeds black, ovoid, ca. 3 mm, ca. 2 mm in diam., white hispidulous; strophiole white, 3-lobed, ca. 1/2 as long as seeds. Fl. and fr. Jul–Sep.

• Grasslands on slopes of hills; ca. 2900 m. NW Yunnan (Lijiang).

42. *Polygala sibirica* Linnaeus, Sp. Pl. 2: 702. 1753.

西伯利亚远志 xi bo li ya yuan zhi

Herbs perennial, 10–30 cm tall. Roots woody. Stems caespitose, often erect, pubescent. Petiole short; leaf blade papery or subleathery; lower leaves ovate, small, ca. 6 \times 4 mm, apex obtuse; upper leaves lanceolate or elliptic-lanceolate, large, 10–20 \times 3–6 mm, green, both surfaces pubescent, midvein raised abaxially, impressed adaxially, lateral veins obscure or raised

adaxially, base cuneate, margin entire, slightly recurved, apex obtuse, with acumen. Racemes extra-axillary or pseudoterminal, usually over apex of stem, branches pubescent, few flowered; bracteoles 3, subulate-lanceolate, ca. 2 mm, pubescent. Flowers 6–10 mm. Sepals 5, persistent, outside pubescent, ciliate; outer sepals 3, lanceolate, ca. 3 mm; inner sepals 2, petaloid, subfalcate, ca. 7.5×3 mm, greenish, base unguiculate, apex cuspidate. Petals 3, connate in lower 2/5, blue-purple; lateral petals 5–6 mm, longer than keel, inside hairy at base, apex rounded, retuse; keel hairy abaxially, apex with fimbriate appendages. Stamens 8; filaments 5–6 mm, united at least in lower 2/3, forming an open ciliate staminal sheath; anthers ovoid. Ovary obovoid, ca. 2 mm in diam., apex ciliate; style thickened, apex curved, ca. 5 mm; stigmas moderately well separated. Capsule subcordate, ca. 5 mm in diam., narrowly winged, shortly ciliate, apex retuse. Seeds black, compressed-oblong, ca. 1.5 mm, densely white pubescent, with white strophiole. Fl. Apr–Jul, fr. May–Aug. *2n* = 34.

Shrub forests, sparse forests, forest margins, grasslands on sandy loam, grassy slopes, gravel, limestone mountains, roadsides on hills; 1100–3300 m. Gansu, Guizhou, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Japan, Kashmir, Korea, Mongolia, Myanmar, Nepal, Russia; SW Asia, Australia, Europe].

- 1a. Leaf blade papery or subleathery, lateral veins obscure; appendages relatively small 42a. var. *sibirica*
 1b. Leaf blade subleathery, lateral veins raised adaxially; appendages relatively large 42b. var. *megalopha*

42a. *Polygala sibirica* var. *sibirica*

西伯利亚远志(原变种) xi bo li ya yuan zhi (yuan bian zhong)

Polygala japonica Houttuyn var. *cinerascens* Franchet; *P. sibirica* var. *latifolia* Regel; *P. sibirica* var. *stricta* Debeaux.

Herbs erect. Leaf blade papery or subleathery, margin slightly recurved, lateral veins obscure. Carina with small fimbriate appendages. Fl. Apr–Jul, fr. May–Aug.

Shrub forests, forest margins, grasslands on sandy loam, gravel, limestone mountains; 1100–3300 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Xizang, Yunnan [Bhutan, India, Japan, Kashmir, Korea, Mongolia, Myanmar, Nepal, Russia; SW Asia, Australia, Europe].

42b. *Polygala sibirica* var. *megalopha* Franchet, Bull. Soc. Bot. France 33: 417. 1886.

苦远志 ku yuan zhi

Herbs perennial, dwarf. Branches diffuse. Leaf blade subleathery, margin recurved, lateral veins raised adaxially. Carina with broadly fimbriate large appendages.

• Sparse forests, grassy slopes, roadsides on hills; 1800–2600 m. Sichuan, Yunnan.

43. *Polygala elegans* Wallich ex Royle, Ill. Bot. Himal. Mts. 76. 1834.

雅致远志 ya zhi yuan zhi

Polygala myrsinites Royle; *P. sibirica* Linnaeus var. *elegans* (Wallich ex Royle) H. Hara.

Herbs perennial, 15–20 cm tall. Stems many, caespitose, erect, or decumbent, green or dark purple, pubescent. Petiole very short, pubescent; leaf blade papery; lower leaves ovate, small; upper leaves linear-lanceolate or elliptic-lanceolate, 1.5–2.5 cm \times 3–5 mm, both surfaces green, abaxially slightly shiny, glabrous or crisped pubescent along margin adaxially, midvein raised abaxially, slightly impressed adaxially, veins including reticulate veins slightly raised on both surfaces, base obtuse, margin revolute, apex obtuse, mucronate. Racemes terminal or axillary, less than 10-flowered, sometimes a solitary axillary flower, pubescent; bracts 3, caducous, purplish, linear, unequal, ca. 1/3 as long as pedicels. Flowers ca. 1 cm. Sepals 5, persistent, ciliate; outer sepals 3, nearly equal, 5–6 mm, upper one boatlike, lateral ones elliptic-lanceolate, outside pubescent; inner sepals 2, purplish red, petaloid, ovate-oblong or elliptic-oblong, 8–9 \times 4–5 mm, abaxially pubescent on midvein, base attenuate, apex subrounded, mucronate. Petals 3, connate in lower 1/2, purple-red; lateral petals elliptic, 6–7 mm, inside pubescent at base; carina cucullate, ca. 7 mm, base unguiculate, apex with large fimbriate appendages to 4 mm. Stamens 8; filaments lower 2/3 united and forming an open staminal sheath, adnate with petals; anthers oblong. Ovary obovoid, ca. 2 mm, ca. 1 mm in diam.; style curved, 4–5 mm; stigmas 2. Capsule suborbicular, ca. 4 mm in diam., broadly winged, apex retuse, eciliate. Seeds not seen. Fl. Jun, fr. Jul–Aug.

Grasslands on mountain slopes; 2300–2900 m. S Xizang (Gyirong) [Bhutan, India, Kashmir, Myanmar, Nepal, Pakistan].

44. *Polygala bomiensis* S. K. Chen & J. Parnell, sp. nov.

波密远志 bo mi yuan zhi

Type: China. Xizang: Bomi Xian, Yücong, hillside, forest understory, alt. 2400 m, 11 Jun 1973, *Exped. Xizang of NW Plateau Institute of Biology, Academia Sinica 0450* (holotype, HNWP); Zayü Xian, Xia Zayü District, ridge of a rice field, alt. 1700 m, 29 Jul 1973, *Exped. Xizang of NW Plateau Institute of Biology, Academia Sinica 1194* (paratype, HNWP); same locality, hillside, alt. 1800 m, 18 Jul 1973, *Exped. Xizang of NW Plateau Institute of Biology, Academia Sinica 1044* (paratype, HNWP).

Polygala japonica Houttuyn *affinis*, sed *foliis lanceolatis vel elliptico-lanceolatis, sepalis 5, ciliis, exterioribus ellipticis, interioribus obovato-oblongis, petalis 3, discretis, filamentis supra 3/4 discretis vel connatis, carunculis trifidis differt*.

Herbs perennial, 10–30 cm tall. Stems many, erect or slightly decumbent, pubescent. Petiole ca. 1 mm, pubescent; leaf blade papery; lower leaves ovate, small; upper leaves lanceolate to elliptic-lanceolate, 1.5–3 \times 0.5–1 cm, abaxially greenish, shiny, adaxially deep green, abaxially very pubescent on veins, midvein raised abaxially, impressed adaxially, lateral veins and reticulate veins raised on both surfaces, base broadly cuneate, margin recurved, apex obtuse, mucronate. Racemes opposite to leaves or extra-axillary, ca. 2 cm, to 5–7 cm at fruiting, pubescent; bracts 3, caducous, ovate-lanceolate, pubescent. Sepals 5, persistent, ciliate; outer sepals 3, elliptic, nearly equal, ca. 3 mm,

3-veined; inner sepals 2, petaloid, obovate-oblong, 5–7 × 2.5–3 mm, with 3 multibranching veins, base unguiculate, apex obtuse, mucronate. Petals 3, free, blue-purple; lateral petals oblong, ca. 3.5 mm, inside pubescent at base, margin deeply undulate, apex rounded; keel cucullate, ca. 5 mm, unguiculate, apex with small appendages. Stamens 8; filaments 3–4 mm, lower 3/4 united into an opening tube and adnate with petals, upper 1/4 free or connate; anthers ovoid. Ovary obovoid, ca. 1.5 mm in diam.; style curved, 2–3 mm; stigmas 2. Capsule suborbicular, ca. 5 mm in diam., broadly winged, apex retuse, mucronate. Seeds black, ovoid, white hispidulous; strophiole 3-lobed, ca. 2/3 as

long as seeds. Fl. May–Jun, fr. May–Jul.

• Forests, forest margins, grasslands, field margins on slopes of hills; 1700–2400 m. SE Xizang (Bomi, Zayü).

The name *Polygala khasiana* Hasskarl was misapplied to this species by S. K. Chen (in C. Y. Wu, Fl. Xizang. 3: 55. 1986).

Although *Polygala bomiensis* is very similar to *P. japonica*, the key difference is that the filaments are united in the lower 3/4 in *P. bomiensis* but fully united into an opening tube in *P. japonica* with the anthers sessile.

4. SALOMONIA Loureiro, Fl. Cochinch. 1: 14. 1790, nom. cons., not Heister ex Fabricius (1759).

齿果草属 chi guo cao shu

Herbs annual, erect. Stems and branches green. Roots aromatic. Leaves simple, alternate, petiolate or sessile; leaf blade green, elliptic, ovate, or ovate-lanceolate, membranous or papery, margin entire. Inflorescence spicate, terminal, bracts with a scarious margin, bracteoles absent. Flowers very small, zygomorphic. Sepals 5, persistent, nearly equal; inner 2 often slightly larger. Petals 3, usually pink-purple; keel cucullate, or arched, longer than lateral petals, without appendages. Stamens 4; filaments united, forming trough-shaped sheath, adnate with petals, open on upper side; anthers connate, dehiscent by an apical pore. Disk absent. Ovary compressed, 2-loculed; ovule 1 per locule, anatropous; style curved, thickened toward apex; stigma capitate. Capsule reniform, broadly orbicular, or obcordate, compressed, margin denticulate, dehiscent by abaxial suture, with 2 seeds dehiscent. Seeds black, shiny, ovoid, glabrous, with endosperm, not strophiolate.

About five species: tropical Asia, tropical Australia; two species in China.

- 1a. Stem usually multibranching, winged; leaf blade ovate-cordate or suborbicular, base truncate to cordate, petiolate; surface of capsule with protruding reticulations, glabrous 1. *S. cantoniensis*
 1b. Stem simple or branched, not winged; leaf blade elliptic or elliptic-lanceolate, base rounded to cuneate, sessile to minutely petiolate; surface of capsule without protruding reticulations, occasionally with minute hairs 2. *S. ciliata*

1. *Salomonium cantoniensis* Loureiro, Fl. Cochinch. 1: 14. 1790.

齿果草 chi guo cao

Salomonium cantoniensis var. *edentula* (Candolle) Gagnepain; *S. edentula* Candolle; *S. subrotunda* Hasskarl.

Herbs annual, erect, 5–25 cm tall. Roots slender, fragrant. Stem thin, multibranching, 3-winged, glabrous. Petiole 1.5–2 mm; leaf blade ovate-cordate or cordate, 5–16 × 5–12 mm, membranous, glabrous, 3-veined, base cordate or truncate, margin entire or slightly undulate, apex obtuse, mucronate. Spike terminal, 1–6 cm, elongated after anthesis. Flowers very small, 2–3 mm, sessile; bracts caducous, very small. Sepals 5, persistent, connate at base, linear-subulate, 0.4–0.5 mm. Petals pink-purple; lateral petals ca. 2.5 mm; keel ca. 3 mm. Filaments ca. 2 mm, united into an open sheath, inside of sheath arachnoid; anthers connate. Ovary reniform, ca. 1 mm in diam., margin narrowly triangular-denticulate; style ca. 2.5 mm; stigma slightly lobed. Capsule reniform, ca. 1 mm, ca. 2 mm in diam., both lateral margins pointedly triangular-denticulate; surface of capsule with protruding reticulations. Seeds 2, black, shiny, ovoid, ca. 1 mm in diam. Fl. Jun–Aug, fr. Aug–Oct.

Forests, forest margins, shrub forests, grasslands on hills and mountain slopes; 600–1500 m. Fujian, Guangdong, Guangxi, Guizhou, S and SE Yunnan, Zhejiang [Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Philippines, Thailand].

Material with the margin of the capsule ± smooth (almost no denticulations) has been separated as *Salomonium cantoniensis* var.

edentula, but as the degree of denticulation in this species is variable and as *S. cantoniensis* var. *edentula* is in all other aspects identical to *S. cantoniensis*, the variety is not here recognized.

2. *Salomonium ciliata* (Linnaeus) Candolle, Prodr. 1: 334. 1824.

椭圆叶齿果草 tuo yuan ye chi guo cao

Polygala ciliata Linnaeus, Sp. Pl. 2: 701. 1753; *Salomonium arnottiana* Miquel; *S. cavaleriei* H. Léveillé; *S. horneri* Hasskarl; *S. oblongifolia* Candolle; *S. rigida* Hasskarl; *S. sessilifolia* D. Don; *S. setosociliata* Hasskarl; *S. stricta* Siebold & Zuccarini.

Herbs annual, erect, 10–20 cm tall. Stem slender, simple or few branched, longitudinally angular and sulcate, glabrous. Leaves sessile; leaf blade elliptic or ovate-lanceolate, 4–8 × 1–2.5 mm, membranous to thinly papery, glabrous, basally 3-veined, base subrounded, margin entire, rarely apex 1- or 2-ciliate, apex acute or acuminate. Spike 4–10 cm; bracts persistent at anthesis, linear, ca. 1 mm. Flowers sessile, small, ca. 2.5 mm. Sepals 5, persistent, connate at base, green, lanceolate-ovate, nearly equal, ca. 1.2 mm, apex acuminate, sparsely ciliate. Petals connate in lower 1/2, red-purple, 2–2.5 mm; keel longer than lateral petals. Filaments ca. 1.5 mm, united forming an open sheath, inside of sheath arachnoid, lower 1/2 of sheath adnate with petals. Ovary obcordate, ca. 0.75 mm in diam., margin filiform denticulate; style ca. 2 mm, median part thickened, cylindrical; stigma capitate. Capsule reniform, ca. 2 mm in diam., apex retuse, margin 2-seriate filiform denticulate, carpel smooth,

without reticulate striae, sometimes minutely hairy. Seeds 2, black, shiny, ovoid, ca. 1 mm in diam. Fl. Jul–Aug, fr. Aug–Sep.

Open and damp grasslands on mountain slopes; 600–1000 m.

Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Jiangsu, Jiangxi, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Australia].

5. *EPIRIXANTHES* Blume, Catalogus, 25. 1823.

寄生鳞叶草属 ji sheng lin ye cao shu

Herbs annual, erect, echlorophyllous, saprophytic. Roots not aromatic. Stems erect, simple or sparsely branched. Leaves sessile, scalelike. Inflorescence spicate, terminal, bracts persistent or caducous, bracteoles present or absent. Flowers very small. Sepals 5, unequal. Petals 3; keel longer than lateral petals, without appendages. Stamens 2–5; filaments united or partly free; anthers dehiscent by a slit. Disk present. Ovary compressed, 2-loculed; ovule 1 per locule, epitropous; style long and straight, or short and bifurcate toward apex. Fruit indehiscent. Seeds ellipsoid, glabrous, nearly without endosperm, with thickened tissue at micropylar end.

About five species: tropical Asia, tropical Australia; one species in China.

1. *Epirixanthes elongata* Blume, Catalogus, 82. 1823.

寄生鳞叶草 ji sheng lin ye cao

Epirixanthes aphylla (Griffith) Merrill; *E. tenella* J. D. Hooker; *Salomonina aphylla* Griffith; *S. elongata* (Blume) Kurz ex Koorders; *S. parasitica* Griffith.

Herbs, echlorophyllous, saprophytic, 5–16 cm tall. Stem erect, violet or yellow-brown, slender, with erect branches. Leaves scalelike, ca. 2 mm, pubescent. Spike terminal, unbranched; peduncles 5–25 mm, slender, ca. 2 mm in diam. Flowers sessile, minute, 1.3–1.5 mm; bracts persistent, basal, linear-lanceolate, longer than flower buds, apex acuminate, bracteoles absent. Sepals 5, free, imbricate, ovate-lanceolate, ca.

1 mm, apex acuminate. Petals 3, connate to 1/2 their length, yellowish or white with pink; lower petal somewhat keel-like and longer than lateral petals, ca. 1.5 mm, without appendages. Stamens 4 or 5; filaments united forming an open sheath adnate with petals; anthers sessile, free, ovoid-oblong. Disk present. Ovary 2-loculed; ovule pendulous; style straight or slightly curved apically, longer than or ca. as long as ovary, thin. Capsule subobcordate, wider than long, ca. 0.6 mm, ca. 1 mm in diam., margin without spines or denticulations, base with persistent sepals, indehiscent. Seeds 2, black, ovoid, ca. 0.5 mm in diam., slightly rugose, without strophiole. Fl. and fr. Jul–Oct.

Forests, bamboo groves; 600–1100 m. Fujian, Hainan, S Yunnan [India, Indonesia, Malaysia, Myanmar, Thailand, Vietnam].